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Electric Railway Journal

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Instructions for Use of Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, or to the state matters of any particular state. The geographical method of grouping serves to locate in the index any article descriptive of practices, conditions, events, etc., when the searcher knows the electric railway, city or state to which the article applies. Groupings are made under the name of the city in which the main office of the company is located, but an exception is made in the case of electrified sections of steam railroads, such entries being made direct under the name of the railroad. City or state affairs appear under the names of the city or state involved.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the common keywords used in the index to

this volume. This list has been subdivided for convenience into thirteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index unless, like "employees," they appear also in small type. As an example of how to use the index, if a reader wishes to locate an article on special trackwork he would obviously look in the list under the general subject Track and under this caption, only Special trackwork could apply to the article in question. The reader would therefore refer to this keyword under S in the body of the index.

In addition to the groups of articles covered by these headings the papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed. Short descriptions of machine tools appear only under the heading "Repair shop equipment" and are not indexed alphabetically, because of the fact that there is a wide choice in most cases of the proper keyword to be used.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION

Accident claim department Accidents (including wrecks) Safety work Storm and fire damage

CARS AND OTHER VEHICLES

Automobiles
Cars (including car design)
Locomotives
Motor buses
Motor trucks
Service and tower trucks
Trackless trolley
Work and wrecking cars

CAR EQUIPMENT

Bearings
Brakes and compressors
Current collection
Electrical equipment
Fixtures
Gears and pinions
Motors
Trucks
Wheels and axies

EMPLOYEES

Employees
Labor
Sirikes and arbitrations
Wage decreases
Wage increases
Wages and working agreements

FARES

Fare collection (including apparatus)
Fare decreases
Fare increases
Fares
Traffic investigations
Traffic atimulation

FINANCIAL LEGAL AND STATISTICS

Abandoning of lines
Accounting
Appraisal of railway property
Financial
Franchises
Insurance
Legal
Legal
Legislation for railways
Market conditions
Operating records and costs
Public service and regulative
commissions
Statistics

HEAVY ELECTRIC TRACTION

Heavy electric traction (general) Locomotives

MAINTENANCE OF EQUIPMENT

insulating materials
Lubrication
Maintenance practice
Repair shop practice
Repair shops and equipment
Stores
Tests of materials and equipment
Welding

POWER

Energy checking devices
Energy consumption
Fuel
Overhead contact system
Power distribution
Power generation
Power stations and equipment
Substations and equipment

STRUCTURES

Carhouses and storage yards power stations and equipment Repair shops and equipment Substations and equipment Terminals Waiting stations

TRACK

Payements
Rali joints and bonds
Ralis
Special trackwork
Ties
Track construction
Track maintenance

TRAFFIC AND TRANSPORTATION

Freight and express
Interurban railways
Merchandising transportation
Publicity
Public, Relations with
Schedules and timetables
Signals
Stopping of cars
Traffic investigations
Traffic regulation
Traffic stimulation
Transportation, Metropolitan

MISCELLANEOUS

Electrolysis
Engineers
Living costs
Management
Municipsi ownership
Radio telephone for railways
Railways (general)
Snow removal
Standardization
Subways

INDEX TO VOLUME 61

PAGES BY WEEKS January 6	Advertising (see Merchandising Transportation and Publicity). Akron, Ohio:—Northern Ohio Traction and Light Co.:	 Committees, Co-operation with, Comments on, 151, 503. Company section activities: _United Electric Ry., 933.
January 13. 69 to 108 January 20. 109 to 150 January 27. 151 to 194 February 3. 195 to 232	Buses given trial, Results uncertain [Blinn], 165; Comments on, 152. Bus service for Canton proposed, 817. Joint freight service thrives, 728, New franchise proposed, 490.	-Midvear meeting: Attracts wide attention, 341. Delegate transportation rates reduced, 253. Ladies' program, 253, 288. Message from President Harding, 287. Papers, 273: Comments on, 271.
February 10. 233 to 270 February 17. 271 to 314 February 24. 315 to 356	Passenger cars remodeled for freight service, 728. Wages increased, 819. Wheel removal equipment [Squier], *447; Comments on, 437.	President Harding receives railway men, 288. Proceedings and discussion, 286. Program, 92, 214. Railway conditions, 1921 and 1922, compared,
March 3 357 to 394 March 10 395 to 434 March 17 435 to 502	Alabama Power Co. (see Birmingham, Ala.) Alabama Traction Light & Power Co. (see New York City), Alamance Ry. (see Burlington, N. C.)	578. —Recommendations to Chamber of Commerce, 693. American Electric Railway Claims Association:
March 24 503 to 546 March 31 547 to 588 April 7 589 to 630	Albany, N. Y.: —United Traction Co.: Commission recommendations on ear operation, 194: Compressor mounted on truck, *128.	-Committee activities: Executive, 290. American Electric Railway Engineering Assn.: -Achievements during twenty years, Comments on, 358Committee activities:
April 14 631 to 668 April 21 669 to 708 April 28 709 to 748	Improvement program, 656, Paving tax information poster, 423. Safety suggestions for automobilists, 364. Strike situation, 979. Allentown, Pa.: —Lehigh Valley Transit Co.:	Buildings and structures, 341, 694, 1016, Engineering accounting, 731, 1051, Equipment committee, 138, 529, Executive, 289
May 5. 749 to 788 May 12. 789 to 830 May 19. 831 to 870	—Lehigh Valley Transit Co.: Armature bearings, Bronze linings. *1011. Armature dipping equipment, *689. Armature rack, Large capacity, *814. Bearings, Frary metal used for, *854. Chair car service, *759.	Heavy electric traction 93, 376, 1051. Non-fired pressure vessels, 892. Power distribution, 571, 893. Power generation, 694. Purchases and stores committee, 138, 417, Rail and wheel contour, 290, 856.
May 26 870 to 910 June 2 911 to 948 June 9 949 to 990 June 16 991 to 1030	Commutator slotter, *1052. Connecting rods. Finishing equipment. *1053. Cylinder and bearing repair equipment, *973. Door-controller interlocking device, 895.	Rail and wheel contour, 290, 856. Way committee, 214, 611, 972. Wood preservation, 651, 1051; Comments on, 669. History of, Early organization [Cram], 411. American Electric Railway Transportation and
June 23	Electric furnace reduces maintenance costs. *671; Comments on, 669. Guard rail construction, *934. Headway recorder, Direct reading, *733. Lightning arresters for ears, Maintenance,	Traffic Association: —Committee activities: Accident prevention, 893. Bus operation, 290. Executive, 289.
A	776. Obsolete cars remodeled for one man operation, *996; Comments on, 991. Passenger loading platforms, *878. Rail joints boosted, *1009. Rail joints, Compromise, *816.	Merchandising transportation, 214, Traffic regulations committee, 138, —Rules for city operation available, 417, American Engineering Council: —Annual meeting, 175,
Abandoning of lines: —Buffalo & Lake Erie Traction Co., 306. —Busea replace trolleys in Brattleboro, Vt., 943. —Chicago, Aurora & De Kalb Electric R.R., 349. —Columbus, Newark & Zanesville Electric Ry.,	Sander, Home made, *774. Seat head roll covering method, *1093. Sweeper, Chainless, *1077. Ties made from old rails, *852.	American Institute of Electrical Engineers; —Midwinter convention; Program, 92, 297; Comments on, 233. —Spring convention; Program, 651. —Summer convention;
494. —Hamilton & Dundas Street Ry., 188. —Indiana, Columbus & Eastern Traction Co., Branch line, 225, 396, 789, 825, 981. —Ithaca Short Line, 193.	Track construction to stop pavement heaving, *677; [Smith], e889; Comments on, 670. Trolley wire greasing equipment, *935. Welded joints, Large seam section, *894. Welding rooms, Arrangements, 1012.	Program, 694. American Electric Power Co. (see Philadelphia, Pa.) American Public Utilities Co. (see Grand Rapids,
 — Ithaca Short Line, 193. — Lack of support anficient reason, 981. — Newburgh, N. Y., Buses replace railway, 662. — Orange County Traction Co., 220. — Pacific Electric Ry., 61. — Peninsular Ry. 193. — Pennsylvania & Maryland Street Ry., 61. 	Alton, Ill.: —Alton, Granite & St. Lonis Traction Co.: Wage increase granted, 937. American Association of Engineers:	Mich.) American Railway Engineering Assn.: —Annual convention: Proceedings, 523, American Rys. (see also American Electric Power
Restraining injunction sought, 536. Sought in Keyport, N. J., 982. South Carolina Gas & Electric Co., 60, 104, 183, 1096.	—Annual convention: Officers elected, 813. American Electric Power Co. (see Philadelphia, Pa.) American Electric Railway Accountants Assn.:	Co.) American Rys. (see Philadelphia, Ps.) American Society of Mechanical Engineers: —Officers nominated. 971. American Welding Society:
—Springfield, Troy & Piqua Ry., 56. —Springfield & Washington Ry., 141. —Tabulation, 45. —Tri-City Ry., 660. —Twenty-third Street Ry., 540. —Wheeling, W. Va., Proposal, 620.	Achievements since organization [Glover], 365; Comments on, 367. —Committee activities: Engineering accounting, 731, 1051. Stores accounting, 214.	—Annual meeting: Proceedings, 773, Program, 609. Anderson, Ind.: —Union Traction Company of Indiana:
Aberdeen, Wash.: —Gray's Harbor Railway & Light Co.: Window wiper, Automatic type, *339. Accident claim department: —Criticism of Detroit system, 647.	American Electric Railway Association: —Annual convention: Committee on location and exhibits appointed, 179. Entertainment committee personnel, 892.	Freight business secured, 497. Appraisal of railway property: —Alabama Power Co., 1021. —Boston Elevated Ry., 291. —Buffalo hearing resumed, 739, 1062.
-Pittsburgh Ry, plan approved, 260. Accident prevention (see Safety work).	Entertainment committee personnel, 892. Date and location, 376; Comments on, 195. Exhibit desirable, Comments on, 195. -Association standards adopted by A.E.S.C., 341. -Bureau of Information and Service:	Community Traction Co., 1022. Denver hearing, 490, 953. Depreciation of four per cent allowed in Markagon Mich. 261
[Wilde], 890. —Car demolished at grade crossing, *185. —Car struck by freight train, 97. —Collision caused by fog, 383. Collision caused by figurery rails, *343.	Repurts available, 55, 291, 417, 651, 856, 1016. —Chamber of Commerce, Delegates to 611. —Charles A. Coffin award conditions, 529. —Coal supply service discontinued, 611.	-Duluth Street Ry. valuation figures, 552Los Angeles valuation, 387, 426, -Minneapolis valuation hearings resumed, 739Memphis valuation protested, 309New Jersey commission valuation protested, 63, 1024.
—Elevated train falls to street in New York City. *1097. —Grade erossing collision, *343. —Milwankee statistics analyzed, 582. —One-man car statistics, 602.	—Committee activities: Charles A. Coffin prize, 972. Company and associate membership, 179, 933. Co-operation of manufacturers, 299, 651.	Norfolk, Va., 902 Philadelphia Rapid Transit, 306, 701, 821, 863, 1101 Richmond, Va., 161 St., Louis valuation, Details of 346, 980
—Test run over accident route, 978. Accounting: —Achievements of A.E.R.A.A. [Glover], 365: Comments on, 357. —Cement bag records [Genest], *483.	Dinner and location, 290. Educational, 55, 892. Equipment committee, 892. Executive, 179, 289, 610, 892. Exhibit committee, 1051.	— Seranton, Pa., Valnation upheld, 782. — Supreme Court Ruling, 903. — Toronto Ry., Method autlined, 247, 427, 778; Comments on, 234. — Virginia Railway & Power Co., 161, 902.
Cost accounting in engineering departments [Geneat], *755, *797. Expenditure control bettered by, Comments	Inductive co-ordination, 651. Insurance, 611. Motor buses and trucks, 571. National relations, 289. One-man ears, 417.	Arbitration (see Strikes and Arbitration). Arbitration Society of America: —Committee formed to further work, 250. Arkansas Valley Interurban Ry. (see Wichita.)
Expense accounts, subdividing system [Elliott], 1045. Freight journal entry system [Heath], 522. Machines for, Use of [Peery], 413. Repair shop costs on piece-work basis, *443; Comments on, 436. Stores accounting system [Farwell], 519.	Publicity, 55, 417. Special taxes, 290. Subjects and meeting, 610. Valuation, 290, 610, 1016. Welded rail joints, 92, 341, 376, 972; Comments on, 70.	Kan.) Ashtabula, O.: —Ashtabula Municipal Ry.: Dec.Jan. report, 261. Eight months' report, 781.

Associated Advertising Clubs of the World; -Annual convention: Program, 932.

Program, 932.
Atlanta, Ga.:

—Georgia Railway & Power Co.:

Annual report, 1021.
Car poster, "move up front," *605.
Fare argument scheduled, 351.
Improvement program, 897.
Overhead network support, Details, *922.
Poster for car window, *412.
Suit determines limits of municipal fare control, 981.
Atlantic Shore Line Ry, (see Sanford, Me.)

Austra, III.;

—Chicago, Aurora & De Kalb Electric R.R.;

—Chicago, Aurora & Elgin R.R.;

—Chicago, Aurora & Elgin R.R.;

Buffet-parlor car, Details, *642.

Aurora, Plainfield & Joliet Ry, (see Joliet, III.)

Australasia;

Midland electrification progressing, 91,
Automobiles (see also Motor buses).
Actional problem discussed [Howard], 570,
Accidents (see Statistics).
Automobile versus railway as carrier, 640,
Drivers' safety education [Price], *064,
Federal test for operators suggested, 1078,
Insurance, Compulsory, 600,
Safety suggestions for operators, 364,
Saturation point, Comments on, 789,
Stored during snow period, Comments on, 547,
Traffic regulation in downtown streets, 77;
Comments on, 69,
Automotive equipment:

В

Baltimore, Md.:

—United Railways & Electric Co.:
Automatic substations ordered, 393.
Blueprint corrections, Ink for, 689.
Buses presented to city, 541.
Shop poster, "Our creed," 4419.
Vehicular traffic study, *77; Comments oo, -Washington, Baltimore & Annapolis Electric R.R.:
Baltimore terminal, Details of, *549.
Bamberger Electric R.R. (see Salt Lake City, Utah):
Bearings (see also Lubrication):
-Anti-friction bearings for cars, Comments on, 750. T50.

Armature bearing, Solid end, *126.

Babbitted:

Jiss Ior, *419.

Practice and equipment for babbitting, *321,

Tinning before babbitting [Dean], *329.

Frary metal used for, *854.

Lubrication system cuts cost [Robinson], *110.

Motor bearing maintenance [Dean], *111.

Maintenance and repairs [see Repair shop practice); - Maintenance and repairs (see Repair shop practice):

Roller bearing. "Flat line" ruceway. *487.

- Roller bearings successful in Germany, 813.

- Roller side bearing (Bury). *420.

- Roller, used in turntable, 1054.

- Roller versus plain, English Testa, *682.

Reaver Valley Traction Co. (see New Brighton, Pa.):

Beloit Traction Co.;

Double track No paving obligations, 1019.

Berkshire Street Ry. (see Pittsfield, Mass.):

Beloit street Ry. (see Pittsfield, Mass.): perint uses Germany;
Binghamton, N. Y.;

—Binghamton Ry.;

Cars kept clean, 338.

Gear grease, Paper cartridges, 815.

Maintenance practice, Few reserve cars, 1903.

Mater angular accord good, 275. 1903. Motor service record good, 775. One man ears popular, Details, Comments on, 749. Six cent fare eatended, 146 • 700: Birmingbam, Ala.;
—Alabama Power Co.;
Minigomery railways purchase proposed,
60. G0.
Valuation figuring, 1021

Blemingham Italiway, Light & Power Co.:
Minimum wage increased, 977.
One man "Jim Crow" cars required, 302.
533, 996, 778, 857
Wheel removal equipment [Squier], *447:
Comments on, 437

Birmingham Tidewater Ry.:
Independent operation expected 264

Jitney men propose ordinance, 985. Bloomaburg, Pa.:
—North Branch Transit Co:
—Cars rebuilt for one man operation, *327.
Bonding (see Rail joints and bonds):

Book reviews (Continued):

—Commercial "Baedeker" of Latin America by Department of Commerce, 105.

—Decisions of courts and opinions affecting labor in 1921, by U. S. Department of Labor, 2646.

—Depreciation of public utility properties, by Henry Earle Riggs, 583.

—Direct current machinery, by Harold Pender, 105. Earning power of railroads for 1922, by Floyd W. Mundy, 583.

E. M. F. electrical year book, 986.

Engineering economics—First principles, by J. C. L. Fish, 826.

Easentials of transformer practice, by Emerson G. Reed, 086.

Highways and highway transportation, by George R. Chatburn, 986.

New edition of Cook's wiring, by Arthur L. Cook, 986.

Power commission report, by Federal Power Commission, 195.

Preparation of light aluminum-copper casting alloys, by R. J. Anderson, 206.

Preparation, Transportation and combustion of powdered coal, by Bureau of Mines, 826.

Rate making for public utilities, by Lamar Lyndon, 826.

Report of Director of Bureau of Mines, 105.

Report of first annual conference of Tennessee Public Service Assu, 206.

Shall state regulation of public utilities be abandoned, issued by Institute of American Business, 583.

The engineering index for 1922, published by A. S. M. E., 986.

The reorganization of railways in Great Britain, 1ts progress and prospects, by H. B. Allin Smith, 266.

Thermal stresses in steel car wheels, by Bureau of Standards, 826.

The young man and civil engineering, by George F. Swain, 986.

Year book of American Engineering Standards Committee, 826.

Are-welding apparatus, Transportation of, 95.

Boiler house extension, *116.

Cars, Light weight, Design details, *85.

Co-operative course with M. I. T., 678.

Cast-of-living chart, *141.

Employees course in practical electricity, 801.

Fare collection and transfer system, *204.

"Fields corner plan," 440, 976, 1056.

Financial history of last four years, 222.

January report, 387.

Labor costs compared with those in Philadelphia [Dana], et80.

Malden must choose between jitney and railway, 350, 429.

Passenger statistics covering seven years, 222.

Rail Joints, Welded, Extensive tests, *555.

Repair shops designed to minimize waste Earning power of railroads for 1922, by Floyd W. Mundy, 583. E. M. F. electrical year book, 986. Passenger statistics covering seven years.
2022.
Rail joints, Welded, Extensive tests, *555.
Repair shops designed to minimize waste time, *230.
Service at cost indersed, 140.
Snow loading machine, *216.
Track maintenance machinery extensively used, *458; Comments on, 430.
Transportation district, 98.
Wages to be arbitrated, 1098.
Eastern Massachneetts Street Ry.:
Annual report, 780.
Bulletin board, Revolving, *(187.
Bus line purchase planned, 1025.
Rus operation authorized, 497.
Car air reservoirs, Hydrostatic test [Bolt].
*851.
Car posters, Personal touch, *606.

Car air reservoirs, Hydrostatic test [Bolt].

*851.

Car posters, Personal touch. *696.

Force blast supplied by old compressor motor, 377.

Jitney rights sought in Malden, 190, 227.

Oil consumption minimized, 573.

Pit equation in close quarters, 574.

Pit light, protected against water, *686.

Power to be purchased, 1929.

Sand drier and screener, *276.

Shop kept neat, Scheme outlined, 124.

Shop notes, *419.

Strike settled, Wages to be arbitrated, 819.

Trolley pole painting made easy, 531.

Trolley wheels, Lubrication of, 343.

Trucks transferred from pit to pit, *337.

Wheel removal equipment [Squier], *447;

Comments on, 437.

—Transit conditions analyzed, 291.

Boaton & Worceater Street Ry. (see Framing-ham, Mass.) Hrakes and compressors;
—Air compressor mounted on Ford chassis,
*339

Car air reservoirs. Hydrostatic tests [Bolt],

*851

-Compressor mounted on truck *128

-Compressor parts. Cleaning method, 573.

-Fulcrums. Forgred steel, *613.

-Hand beake, Ratchet type, *255.

-Ioside rigging eliminates trouble, *131.

-Repair and maintenance (see Repair shop practice)

-Safety interlocks with door and power control, *369

-Slack situater for brake rigging (Sauvage)

Slack adjuster for brake rigging [Sauvage], *186

-Test proceedure [Dean], *319 -Testa Operation, Details of [Sanders], *402 -Two car train equipment [Sanders], *402 -Variable load brake described [McCune], *54

Brattleboro, Vt.:

—Twin States Gas & Electric Co.:

Buses replace trolley, 943.

Bridgeton, N. J.:

—Cumberland Traction Co.:
Service to be resumed, 700.
Stock pledged, 583.
British Columbia Electric Ry. (see Vancouver.
B. C., Can.)

B. C., Can.)
Brooklyn, N. Y.:

-Brooklyn City R.R.:

One-man ear operating statistics, 662.

Waga increase announced, 1069.

-Brooklyn-Manhattan Transit Corp.:

Car purchases, 1069.

Elevated train falls to street, *1097.

-Brooklyn Rapid Transit Co.:

Car heating controlled from main office, *769.

Car heating controlled from main office.

*769.

Elevated construction cost [Cram], c513.

January report, 428.

Reorganization, 143, 304, 540, 660, 862, 103, 982, 1022; Comments on, 398.

Trunsit commission report on, 493.

Truck overhauling methods, *833; Comments on, 831.

—Manhattan Bridge Three Cent Line;
Accident, Test run made, 978.

—New York Consolidated Ry.;
Compressor parts, Cleaning method, 573.

Trucks lifted by wheels, *1009.

Truck overhauling shop, Order maintains, *975.

Wheel lifting coulpment, *1012.

Budget system (see Financial);
Buffalo & Lake Eric Traction Co. (see Eric, Pa.)

Buffalo, N. Y.;

Pa.)

Buffalo, N. Y.;

City authorities blamed by commission for poor transit service, 257.

Bus permits denied, 824.

—International Ry.;

Annual report, 539, 580.
Co-operative plan adopted, 218.
Fare hearings, 343, 429, 582, 824, 864, 984, 1026.

Former employees indicted for dynamiting train, 18, 344, 1956.

Jitney situation, 62, 536, 970, 678, 1065.

Replacement of trolleys by buses proposed, 420.

Service at cost proposed, 380.

429. Service at cost proposed, 380. Strikers sentenced for disorders, 260. Strike stination, 62, 302, 344, 539, 930. Valuation hearings resumed, 739, 1062, Wages, Emergency strike rates lowered.

Burlington, N. C.:

—Alamance Ry.:
Property not sold, 425.

C

California Electric Railway Assn.; —Officers elected, 1010.

(see Newark, N. J.).

sion, 768.
Camden, New Jersey:
—Public Service R. (see New Canadian Electric Railway Assn.:
—Annual convention:
—Program, 1015.
Capital Traction Co. (see Washin, Car eards (see Publicity).
Car design (see Cars). (see Washington, D. C.).

Carhouses and slorage yards:

—Fire hazard, Comments on, 1031,

—Fice prevention apparatus, stripes lead to,
854.

-Fire prevention apparatus, stripes lead to, 854.

- Light maintenance and inspection, Handling of, °643.

- Paint shop design, Details, °923.

- Storage, Open va. enclosed, Survey, °993; Comments on, 991.

- Trolley network support, Details, °922.

Cars (including Car design):

- Apperance important, Comments on, 437.

- Area per passenger, America and Great Britain compared i Turner I. 857; Comments on, 949.

- Articulated train considered for Detroit, °729; IColbyl, e889.

- Attractiveness stressed in Europe. [Kappeynel, °367.

- Bargagar cars converted for passenger service, 418.

- Buffet-parlor car, Details of, °642.

-- Daggage care converted for passenger service, 418.

Buffet-parlor car, Details of, *642.

-- Capital Traction Co. equipment. [Dulgleish], *235.

-- Chair car, *750.

-- Cleveland trailer, Entrance arrangement changes, *1044.

-- Decoration and appointments as selling factors [Hungerford], 1087.

-- Defacement of, 832.

-- Detaign, Comfort first consideration, [Thompeonl, 516; Comments on, 1032.

-- Design, 1922; Comments on, 1032, tendencies, *13; Comments on, 1.

-- Detroit Municipal By, equipment, 508, *729; Comments on, 503.

-- Doors and steps, Pneumatic operation of Broten], 568.

Cars (including car design) (Continued);

—Double-deck suggested for Detroit, 782.

—Double truck, For one or two man operation [Dewhurst], *181.

—Double truck remodeled for one man operation, *123. tion, *123.

-Fiae appointments, Comments on, 832.

-Havana, Cuba construction details [Gottschalk], *1081.

-Heating controlled from main office, *769, -Heating, Electricity vs. hot air, 1107, -Interurban:

Capacity high, Light weight, *913.

Design details, *959.

Light, High-speed, Reduce expenditure [Gunn], 135.

Steel, suburban type, Details of, *561. Light bulbs stolen from ["Executive"], c512. Lighting, Development trend, *1076. Lighting fixture shorts burned out lamp, *1095. *1095.

-Light weight trains, Details of, *85.

-Location shown by tags on board, *377.

-One man.

An economic need [Morgan], 167.

Approved in Fort Worth, Tex., 307.

Comfort emphasized in design, *804.

Commission investigation in 14 cities, Report on, 862.

Doomed in Fairmont, W. Va., 301.

Double truck cars reconstructed, *530.

Double truck type used in Cincinnati, 258 Fare collection systems, 566.

Favored by Philadelphia Chamber of Commerce, 156.

Introduced in Europe, *91.

"Jim Crow" cars required in Birmingham, Ala., 362, 533, 396, 778, 857.

Justification sought in Washington, D. C., 429. 429.
London, Eng.. Experiments successful, 1000. Milwankee, protests, 351.
Obsolete cars remodeled in Allentewa, Pa., *996; Comments on, 991.
One-man two-man cars to be used in Conn., 497.
Operation approved in Salt Lake City, 1064. Operation recommendations by Commission, 104.
Operation upheld in Lansing, Mich., 865.
Opposed in Duluth, Minn., 582.
Ordinance permitting operation in Columbia, S. C., 977.
Ordinance prohibits, Injunction granted, 422.
422.
ermitted in Johnstown, Pa., 944. 422.

Permitted in Johnstown, Pa., 944.

Popular in Binghamton, N. Y., *766;
Comments on, 746.

Restriction recommended in Detroit of Columbia, 865.

Safe and economical, Hearing shows, *601.

Safety devices for, *369.

Statistics, Operating [Graham], 168. Statistics, Operating [Graham], 168.

—Paint shop design, Details, *923,
—Painting, (see Painting)
—Passenger cars remodeled for freight service, 728.
—Philadelphia equipment, Construction details, 433, *1673.
—Rebuilt during 1922, tabulation, 41.
—Reconstructed, Berlin, Germany, *130.
—Rehabilitating plans, Detroit United Rv., 787.
—Remodeled for one man operation, *327,
—Safety (see Cars, One man);
—Sales in 1922 increase, *35; Comments on. 1.
—Shbway, Quiet, Attractive, Details of, *751;
—Comments on, 749, 832.
—Texas Interurban Ry, equipment [Fowler], *501.
—Trailer, Motorized, Control details, *919; *591.

-Trailer, Motorized. Control details, *919; Comments on, 912.

-Trailers discontinued in London, 186.

-Trailer, three doors, Details of, *1033.

-Train or single operation, Details of [Sanders], *402.

-Train, Two car articulated, Economical [Lucas], c869; [Colby], c889.

-Types in New York, London, Paris and Berlin compared [Turner], 153. Types recommended for New Orleans, *961.

Wagon for rails or pavement, [Schrey],
*c1049.
Cartoons (see Publicity, Car cards and posters). Cartoons (see Publicity, Car cards and posters)
Cedarburg, Wis.:
—Milwaukee Northern Ry.:
One man cars protested, 351.
Parlor ear service started, 984.
Terminal changed in Milwaukee, 265.
Central Electric Railwsy Accountants' Assn.:
—Annual meeting:
Papers, 413, 522, 525.
Program and proceedings, 297, 375.
—Inty meeting: Program and proceedings, 297, 375.

July meeting:
Program, £13.

Central Electric Railway Association:
—Anoual meeting:
Papers and discussions, 135, 163, 213.
Program, 55.
—Committee activities:
—Car braking, 933.
—Committee appointments, 856.
—Officers elected, 164.
—Secretary-Treasurer report, 163.
—Summer meeting:
—Arrangements committee personnel, 253, Date changed, 341, 416.
—Program, 1690.
—Wheel tread width canvass, 856.

Central Electric Railway Traffic Association:
—January meeting, 253,
—Tariff on explosives considered, 813

Champaign, Ill.:

—Urbana & Champaign Railway, Gas & Electric Co.:

Grade crossing may be eliminated, 257.

Charles A. Coffin Foundation: Charles A. Coffin Foundation:

—Award, Conditions controlling, 529.

—Committee meeting, 280.

—Medal awarded, 978

Charleston, S. C.:

—Charleston Consolidated Railway & Lighting Co.;
Study of system to be made, 944.
Charleston, W. Va.:
—Columbia Gas & Electric Co.:
Annual report, 699.
Charlotte, N. C.:
—Southern Public Utilities Co.:
Safety first contest, 383.
Charlottesville, Va:
—Charlottesville, Va:
—Charlottesvil Chicago III.:

Chicago Elevated Rys.:

Advertising on bill boards, *203.

Air compressor, Jir for reboring, *1010.

Americanization educational program si Americanization educational program suc-esful, 373.

Armature colls, cleaned by boiling, 377,

Armature maintenance practice, *841.

Collision in fog, 383.

Employees, Training for executives [Blair],
565.

Extension under way, 696.

Improvement expense estimates, 615.

Lining up equalizing bar, *689.

Motor cases, Jig for reboring, *335,

Multiple unit control test, 894.

Pedestal jaw bolts, Removal equipment,
*613,

Station built. *422. *613, Station built, *422. Trips outlined for patrons, 226. Trolley rail height gage, 420. Truck overhauling methods, *833; Comments on, 831. ments on. 831.

Chicago Lake Shore & South Bend Ry., (see Michigan City, Ind.)

—Chicago Rys.;
Suit to force dividend payment, 986.

—Chicago Surface Lines:
Annual report, 618.
City suit to collect profits dismissed, 738.
Condictors arrested, Using mutilated coins, 140. 140.
"Delay departments" analyzes service inter-ruptions, 769.
Message to employees, 616.
Service impaired by political antagonism,
183. Service impaired by political antagonism, 183.

—City administration changed, 496, 615; Comments on, 871.

—Rapid transit plac, 489, 638; Comments on, 646, 1023.

—Peoria Railway Terminal Co.
Receivers report progress, 539.

—Subway suggested, 480.

—Terminal planned for seven railroads, 218; Comments on, 234.

—Transportation atrike threatened, 819, 960, 939, 979, 1020, 1055, 1099.

Chicago, North Shore & Milwaukee R. R. (see Highwood, Ill.), Chicago, South Bend, & Northern Indiana Ry, (see South Bend, Ind.)

Chickasha, Ola;

—Chickasha, Street Ry.;

Concrete ties satisfactory [Wadswortb], c739.

Cineinnaul, O.;

Cineinnaul, O.; Cincinnati, O.:

- Cincinnati, Georgetown & Portsmouth Interurban Ry.:

One-man car hearings, 985.

- Cincinnati, Lawrenceburg & Aurora St. R. R.

Interurban cars to run to Dixie Terminal,
344, 577, 697.

- Cincinnati Traction Co.:

Franchise tax payments deferred, 163, 143,
1103.

One man cars, double truck, in operation,
258.

One man cars to be used, 62.

Property improvement demanded, 736.

- Rapid transit bond issue approved, 387.

Circuit breakers (see Electrical equipment for —Rapid transit bond issue approved, 387.
Circuit breakers (see Electrical equipment for cars or switch heards and equipment).
Citizens' Traction Co. (see Oil City, Pa.)
City Light & Traction Company of Sedalia (see Sedalia, Mo.)
City Railway (see Dayton, O.)
Claim department (see Accident claim department).
Circuland O. ment).
Cleveland, O.:
—Cleveland Ry.:
Annual report, 264.
Antomatic substation experience [Bale],
*359 *405.
Circuit breaker testing panel, *894.
Contracts for track usage by interurban,
882. 882.
Fare decrease announced, 264, 388.
Labor saving machinery pays, *126.
Resistor grid contact spanner, *1013.
Six cent fare in East Cleveland 1664.
Sweeper broom core construction, *1093.
Track costs analyzed, 1007.
Trailer entrance fixtures changed, 1044.
December report, 187.

Cleveland Ry. (Continued):
Pinion puller, *936.
Spring ears used on overhead system, *129.
Transfer table, covered, *934.
Wage increase sought, 383, 534, 735, 779.
888.
—Cleveland, Southwestern & Columbus Ry.:
Armature cores reclaimed, *180.
Brush holder decreases motor failures,
*217.
Chuck for finishing meter hearings *129. *217.

Chuck for finishing motor bearings, *129.

Compressor shafts welded, *124.

Power supply changed from 25 to 60 cycles, 269.

—Lake Shore Electric Ry.:

Brakes, Inside rigging eliminates trouble, *131.

Capital structure changes announced, 861.

Controller drums repaired, *128.

Controller shafts repaired, *128. Coal (see Fuels and Market conditions), Coffin foundation (see Charles A, Collin). Columbia Gas & Electric Co. (see Charleston, W. Va.). Columbia, S. C.

—Columbia Railway, Gas & Electric Co.:

Cacal title reverts to, 342.

One-man car ordinance introduced, 977.

Columbus, Newark & Zanesville Electric Ry.

(see Springfield, O.) Columbus, O.:
—Columbus Railway, Power & Light Co.:
Annual report, 425.
Award sustained, 577. Award sustained, 577.

Committee of One Hundred:
—Committee activities:
Executive, 416.

Commonwealth Power Railway & Light Co.
(see Grand Rapids, Mich.)
Community Traction Co. (see Toledo, O.)
Concord, Hudson & Maynard Street Ry. (see
Maynard, Mass.)
Connecticut Co. (see New Haven, Conn.)
Connecticut Co. (see New Haven, Conn.) Connecticut, State of:

—Commission work outlined [Elwell], 275.
Consnectus of Indexes, 187, 348, 539, 740, 903, 1662. Cumberland Traction Co. (see Bridgeton, N. J.)
Current collection (see also Overhead contact aystem);
—Conduit and overhead systems compared [Dalgleish], *235.
—European railroad practice [Potter], *292.
—Sliding contact replaces rollers, *633.
—Tests of equipment, Report on, *845.
—Trolley, steel roller bearing, *692.

Dallas, Tex.:

—Dallas Ry.:

Fare increase, 663, 1103.

Ballaa-Denton electrification to be started, 898, 1058.

Employees' instruction standardized, 1024.

Trainmen sell transportation, 715.

—Texas Interurban Ry.:

Dallas-Terrell tine opened, 185. *218;

[Fowler], *591; Comments on, 589.

Franchise sought in Denton, 184.

Danbury, Conn.:

—Danbury & Bethel Street Ry.:

Taxes heavy burden [Ives], 287.

Davenport, Ia.:

—Tri City Ry.:

Transfer issuing device, *133.

Wages to be arbitrated, 1617.

Davton, O.:

—City Rulway:

Commended by newspaper, 657.

Double truck ears remodeled for one man operation, *123.

—Davton Street Ry.:

Accident reduction club formed, 265.

Denver, Colo.:

—Denver & Northwestern Ry.:

Stockholders' protective committee formed, 349.

—Denver Tramways:

Bond maturity extension authorized, 620.

Carmen's identification, Names replace numbers, 62.

Fare and valuation hearing, 496, 953.

Financial statement, 494.

Stockholders form protective committee, 349.

—Mayor a municipal ownership advocate, 897.

Depreciation (see Appraisal of railway property or Financial).

Des Moines, Ia.:

—Des Moines (ix)

—Des Moines (ix)

—Perver Municipal Ry.:

Anoual report, 863.

April report, 962.

Articulated train suggested, *729.

Bond issue planned, 259, 492, 617, 669, 1062.

Car stop plan needed, 1064.

Commission authority increase opposed, 820, Critic uninformed, 97.

Detroit Mich.

—Detroit Municipal Ry. (Continued):
Discussed by Mayor Lodze, 59.
Double-deck cars suggested, 782.
Extension of system suggested, 259, 383.
February report, 549.
January report, 427.
Jithey restriction sought, 938, 984.
Loan, short-term, 942.
May report, 1101.
March report, 1101.
March report, 739.
Operation promising, 533.
Overhead line tests, *845.
Paint shop built, Details, *923.
Power plant bond issue voted, 760.
Report "sells" municipal ownership, 371, 508 [Jackson], 6504, 647; Comments on, 503.
Six-cent fare suggested, 541. 503.
Six-cent fare suggested, 541.
Stores department centralized, 1085.
Track notes, *1049.
Traffic graph made on street, *638.
Train crew size operating question [Colby], e880. cs89.
Transit plans, 422, *489, 616, 695; Comments on, 949.
Trial board for trainmen successful, 881.
Wage increase sought, 657, 777, 1958.
Window wiper for motorman, *088. window wiper for motorman, *088.

Detroit United Ry.:
Annual report, 304.
Car rehabilitation plans, 787.

High voltage ring planned, 457.

Jitneys flourish under injunction, 429.

Rapid transit commission complete, 139.

Safety zones, Permanent posts, *1086.

Transit bill would raise bonded debt limit, 383. 383.
—Transit relief urgent, 391.

Dominion Power & Transmission Co. (see Hamilton, Ont., Can.)

Door mechanisms (see Fixures). Dobuque, Ia.:

Dubuque Rectric Co.:
Property bought, 425.
Duluth, Minn.:

Duluth Street Ry.:
One-man cars opposed, 582.
Valuation figures, 552.
Valuation figures, 552.
Annual report, 263, 537.

E

Durham, N. C.;

—Durham Public Service Co.;

Pavement assessment upheld, 342.

Eastern Massachusetts Street Ry. (see Bosion. Mass.) Eastern Wisconsin Electric Co. (see Sheboygan. Wis.) East Liverpool, O.:

—Steubenville, East Liverpool & Beaver Valley Traction Co.:
Fare increase before voters, 345, 439, Interurban cars operating, 345, Strike ended, Wages cut, Fares increased, 817. 817.
Easton, Pa.:
—Easton Transit Co.:
Rail bender, Home made, *687.
East St. Louis, Ill.:
Wheel removal equipment [Squler], *447:
Comments on, 437.
—East St. Louis Ry.:
Fus service started, 145 Edinburgh;
—Mirror in destination signs, *854. —Mirror in destination signs, *854,

Eighth Avenue R.R. (see New York City).

Electrical equipment for cars (except Moiors);

—Addition for one man operation, *327,

—Cable between cars, Connector for, *686,

—Circuit breaker, Automatic control for 734,

—Circuit breaker, Manual operation, *854,

—Dead-man handle, Details of, *379,

—Destination signs, Mirror saves lamps, *854,

—Door-controller interlocking device, 895,

—Electrically heated steam boiler, 922,

—Fine box, Renewsl casy, *690,

—Lamp locking Suggestions for [Baiuss],

—C650, [Pond], c768; [Wefels], c768,

—Lightning fixture, Shorts burned out lamp,

*1095,

—Lightning arrester for car [Goliaday], *418; -Lightning arrester for car [Golladay], *418; T76.

Lecomotive A.C. control systems [Döry], *199.

Motorized trailer, Control details, *019. Comments on, 912.

Push button, High voltage, *1013.

—Safety interlocks for one man car. *309.

—Stop lamp signal, 574.

—Switches rebuilt, 482.

—Two car train control [Sanders], *162.

Electric Rallway Journal, Comments on, 580. Electrification (see Heavy electric traction).

Electrolysis:

Pipe lines, Investigation results [Shepard],

*596; Comments on, 589,

Elevated structures, Comments on cost of, 3

Elk Lick, Pa;

—Premsylvania & Maryland Street Ry;

Abandonment authorized, 61 El Paso, Tex .

—El Paso Electric Ry:

Foremen's training course effective [Rouse],

*840; Comments on, 832;

Improvement program, 58

Consolidation permission sought 538

Electrolysis:

Employees | see also Labor, Strikes and Arbitration, Wages); compurees usee also Labor, Strikes and Arbitration, Wages):

Americanization, Results of [Goodseli], 514.

Americanization through education, 373.

Board of conciliation formed, 777.

Bonus for courtesy, 943.

Buffalo strikers plead not guilty, 344.

Carmen's identification, Names replace numbers, 62.

Coal supply plan commended, 738.

Course in applied electricity, 801.

Conductors make traffic count, 955.

Course in applied electricity, 801.

Conductors arrested for using mutilated coins, 140.

Conductors' "persoosl card" used in public relations campaign, 160.

Co-operation of, How to secure it [Pellissier], 251.

Co-operative funds, Details, 560.

Co-operation of, How to secure it [Pellissier], 251.
Co-operative funds, Details, 560.
Co-operative plan provides insurance and pension, 218.
Dinner as prize, 063.
Development of, Comments on, 315.
Educational guidance, 333.
Effliciency campaign, 97.
Employees' organization betters spirit, 645.
Foremen's relation to [Buffe], 137.
Foremen's training course, Details [Rouse], 4849; Comments on, 832.
Gang organization on track reclaiming job [Pierce], 329.
"Human Maintenance" [Coffey], 1950; Comments on, 1031.
Instruction standardixed in Dallas, Tex., 1024.
Insurance and pension fonds [Kavanagh], 1089.
Interest in work, Stimulation of, Comments

Interest in work, Stimulation of, Comments on, 110,
Interest in work, Stimulation of, Comments on, 110,
International Railway strikers seek state investigation, 392.

Meetings to discuss maintenance problems [Dean], *320.

Merit system, Details of [Jeffrey], 721,
Message from executive favorably received, 616.

Plende pointers 853.

610.

Dienic pointers, 853.

Diecework shop system, Effect on employees, *443; Comments on, 436.

Platform men special police, 656.

Power plant staff reduced, Efficiency increased [Druen], *439; Comments on, 437.

Publicity agents, effective as [Barnes], 570.

Relations with, Commany publications as a factor (Baxter], 523.

Relations with important [Savyer], 518.

Relations with, Mutual trust, Comments on, 548.

548.

-Repair shop staff, Size of, *833; Comments on, 831,
-Safety organization [Funk], 213,
-Safety work training classes [Price], *1041,
-Service buttons for, 180,
-Service record, 51 years, 697,
-Six day week bill in Washington legislature, 309,

Six da

Signature, 309.

Stock to be sold to, 621.

Suggestion card. Personal touch, *513.

Suggestions from, Comments on, 110.

Thrift organization, Comments on, 69.

Trailic police Co-operation with, 422.

Train dynamited, Former employees indicted, 98, 344, 1056.

Training for executive positions [Blair], 565.

Training of, Comments on, 4.

Trainmen's bonus for energy saving, 927.

Trainmens' instruction saves energy [Gould], c503.

Trealment on Deiroit Municipal Ry., 508;

-Trainmens' instruction saves energy (Gould), c563.

Treatment on Detroit Municipal Ry., 508; Comments on, 503.

-Trial board successful, 881.

-Welfare, Discussed by S. P. S. A., 931.

Energy checking devices:
-Economy meters ordered by Public Service Ry., 313.

-Power saved in St. Louis, 605.

Energy consumption:
-Bonus for saving energy, 927.

-Boston Elevated Ry, cost figures, 222.

-Meters leasen, 605.

-Motorized trailer decreases, *919; Comments on, B12.

-Power saving recorders lower, 531.

-Trainmen's instruction lessens [Gould], c563.

Engueers;

Engineers:

--Business man better suited to executive posi-tions, 297.

--College men in transportation department, Comments on, 547, 563.

--Commission engineers conference, ii 1

-Commission engineers conference, 114
-Edocation for public utilities, 1966; Comments on, 632
-Field for discussed by S.P.E. E. 1091
-Internstional congress, Plans discussed, 214
-Need for, Comments on, 2.
-New Year's messages from, 14, 16
-Public affairs, Leadership in, 208, 1058,
-Salaries low on railways Comments on 151
-Traffic engineer, Dottes, '951
-Traffic engineer, Dottes, '951
-Transportation department, Opportunities in [Trumbull], 5563, [Tellurisht], c983 Comments on, 395.
-Utility work, Training for [Itudd], 515
-England (see Great Britain),
-Eric Pa

rie Pa .
-Biffalo & Lake Erie Traction Co .
-Biffalo & Lake Erie Traction Co .
-Abandonment of Dunkirk & Point Gratiot
line proposed, 300.
-Cleaning tank, Oil heated, 815.
-Crane car. Hoisting booms interchangeable,
*260.

Erie, Pa.

Buffaio & Lake Erie Traction Co. (Continued):
Extension to be financed by holding company, 184.
Freight traffic tripled by connection, 768.
Jack, Portable pneumatic. *934.
Oit handling equipment. *840.
Truck strengthened by adding bar, *814.
Wages increased, 819.

—interlocking traffic signals hinder cars, *1038.

Evansville, Ind.;
—Southern Indiana Gas & Electric Co.;
Wage increase announced, 977.

Everett, Wash.:

—Puget Sound International Railway & Power Co.:

Buses purchased, 227.

Express (see Freight and Express).

Fairmount, W. Va.:

--Monongahela Power & Railway Co.:
One man cars protested, 301, 422.

--West Penn Monongahela Co.:
Service abandonment, injunction against sought, 536.

sought, 530.

Fare collection:

-Deposits required from one man operators,
Discussion on, 566.

-Fare Box with change maker (Springfield),
*133.

-Five and ten-cent fares in Boston, *294.

-Hat Checks, New Form, *816.

-Monthly commutation ticket in Rockford,
622.

622.

New Orleans system, *1943.

One-man car methods in Europe, *91.

Passimeter with Coin Box in P. R. T., *127.

Pass alse in Des Moines, *189.

Register, Takes several coins, *1048.

Street collectors urged for heavy traffic, 24il.

Ticket machine used in London, 492, 940.

Transfer, with no punch, in Boston, *204.

Transfers, weak spot in [McCantel, 415.

Turnstiles ordered for stations in New York, 193.

193.
Fare decreases:
—Cleveland Ry., 264, 388.
—Connectient Co., 190.
—Great Britain, 393.
—Jersey Central Traction Co., 64.
—London, England, 186.
—Milwaukree Electric Railway & Light Co., 265.
—Rockford & Interurban Ry., 622.
—South Carolina Gas & Electric Co., 497.

—South Carolina Gas & Electric Co., 497
Fare increases;
—Bellingham, Wash., 1025,
—Bridgeport, Conn., 583,
—Cleveland, O., 1064,
—Dallas Ry., 663, 1103,
—East Liverpool, O., 817,
—Seattle Municipal Ry., 782,
—Virginia Railway & Power Co., 1024,
—Youngstown, Ohio, 1026.

1025.

—Five cent fare impossible in Philadelphia, 309.

—Five cent fare impossible in Philadelphia, 309.

—Five cent fare modified in Norwalk, Conn.

62, 220.

—Five cent fare trial in Seattle, 227, 430, 541,

623, 864, 906, 943, 989, 1019, 1058, 1113,

—Ilalf fare for school children proposed, 227

—Houston, Tex., Controversy 1104.

—Liverpool, Glasgow and Edinburgh compared fTurner1, 1039,

—Mineapolis hearings resumed, 736

—Municipal ordinance void beyond city limits, 984,

—New York City fare controversy, 57, 136, 617, 635, 738, 818, 978, Comments on 2, 272, 790.

—Pasadefia rale protested, 260.

272, 790.

—Pasadefia rate protested, 266.

—Pavement relief ends controversy in Madison, 905.

—Rainier Valley protest, 498, 542.

—Reduction through decreased valuation proposed in New Jersey, 308.

—Scattle & Rainier Valley Ry. hearing, 702.

—Service at cost indorsed in Boston "L." 146.

—Seven cent fare extended in St. Louis, 62.

—Six cent fare continued in Richmond, Va., 389.

—Six cent fare extended in Binghamton, N. Y., 140. ven cent fare justified in Fort Worth, Tex., 367.

367.

Systems compared, New York versus London,
Paris and Berlin [Turner] 153

-Tabulated over ten year perind, *23

-Viewpoint of public more reasonable [Emmons], 283.

Abbreviations: *||flustrated, c Communications, ItEAD THE INSTRUCTIONS AT THE REGINNING OF THE INDEX

Fares (Continued):

—Washington, D. C. controversy, 301, 309, 388, 428, Comments on, 195.

—Weekly pass:
Berlin, Germany trial, *760.
Defeats buses in Washington, D. C., 1064.
Discontinued in Youngstown, O., 542.
Discussed by N. Y. E. R. A., 206.
Fort Wayne trial successful [Greenlandi. 206, 389.
Milwaukee Electric Railway & Light Co. trial, 265.
Railway business increased by [Jacksoni, 177, 206.
Revenue higher, Car miles lower, 428.
Revenue per passenger decreased by, 918.
Ride to put baby asleep, 498.
Seattle & Rainier Valley Ry., Trial, 623.
661.
Size of city fixes method [Jackson], 517.
Springfield, Mo., trial announced, 541.
Success in New Brighton, Pa. [Boyce], 206.
Success in St. John, N. B., Can, 622.
Terre Haute trial success [Walker], 206, 351.
"Tourist pass," in San Diego, 308. 351. "Tourist pass," in San Diego, 308. Washington-Virginia Ry. introduces, 825. Year's record shows success in Fort Wayne, 389. Year's trial successful in Terre Haute [Walker] 1086. --Youngstown increase necessary, 824.
--Zone fares and weekly pass in Berlin, Germany, •760. many, *760.

Fargo, N. D.:

—Northern States Power Co.:
Radio telephone sids line repair, 80

Federal Light & Traction Co. (see New City) Financial: mancia:
-Accumulated dividends funding plan, 262
-Atlantic Shore Line Ry, reorganization, 660.
-American Public Utilities Co, reorganization, 261.

—American Rys, refinancing plan, 142.

—Annual reports (see Statistics, Reports).

—Birmingham-Tidewater bonds sought, 264.

—Bond maturity extension in Denver, 620.

—Bridgeton, N. J., Bonds sold, 700.

—Brooklyn Rapid Transit Co..

Reorgaoization, 143, 304, 540, 660, 862, 904, 982, 1022; Comments on, 396. Business conditions [Coolidge], 282.

Business depression improbable, 909.

California utilities report to commission, 421.

Chicago, North Shore & Milwaukee R.R.
plans changed, 262, 380.

Cincinnati bond issue approved, 387.

Columbus, Newark and Zanesville Electric
Ry, reorganization plaos, 222. -Conditions reflected by purchases, Comments on, 1.

—Credit of railways improving, 26,

—Customer and employee ownership planned by Lake Shore Electric Ry., 861.

—Detroit financing, 383, *489, 617, 647, 796. -European situation, 355. Toledo & Western R.R., 004.

-Holding company to finance extension in Eric, Pa., 184.

-Hoover committee on unemployment, Report of, 587.

-Illinois Traction System merger, 384, 424.

-Indianapolis & Cincinnati Ry, re-equipment financing plan, *913.

-Interborough Rapid Transit Co.:

Reorganization completed, 102.

-Maturities in 1923, 28, 224.

New Jersey Public Service Corp. capital structure changed, 620.

-Forclosures:
Statistics, 45.
Brooklyn Rapid Transit, 904.
Michigan United Rys., 904.
San Francisco-Oakland Terminal Ry., 822., 1062, 1100.
Toledo & Western R.R., 004.

New Orleans Public Service Inc. stock off exchange list, 982.
New York City cannot finance traction plan. 541.
New York Railways, Reorganization planned, 496.
Philadelphia Rapid Transit trust certificates and 192.

sold, 188.

—Plant and equipment expenditures, 1923 estimates, 30.

—Property assessment to provide transit improvements proposed in Philadelphis, 696.

—Public Service Ry. changes stock system, 539, Railway conditions improving [Emmons], 283.

—Railway proposed for 1922 CV.

-Railway prospects for 1923 [Morrow], 24. -Railways as an investment, Comments on, 631.

-Railway securities cannot compete with tax exempt securities [Prescott], 281.
-Receiverships:
- Memphis receivership lifted, 700.
- Peoria Railway Terminal Co. progressing, 539.

539.
Pittsburgh accounting ordered, 346.
Pittsburgh Rys. to emerge, 621, 1018.
New York & Queens County Ry., 142.
Statistics, 45.
-Re-equipment financing plan, •013.

Reports, see Statistics, Reports.

-Sestile Municipal Ry. purchase contract changes sought, 697, 817.

-Securities. Tax exempt replacing railway [Prescott], 281; 809, 862, 904, 941, Comments on, 790.

Financial (Continued):

—Security sales, Advertisiog pays io Milwaukee, 700.

—Separation of properties suggested for United Railways of St. Louis, 941.

—Stock sales by U. L. & R. Co. successful, 102.

—Taxes (see Taxes)

—Traction bonds at low level, 110).

—Transportation investments [Bibbins], 528.

—United Gas & Electric reorganization Capital reduction, 739.

—United Railways Investment Co., Reorganization proposed, 424.

—Winnipeg Electric Ry., Bonds to be issued, 421.

—Winnipeg Electric Ry., Bonds to be fixed first (see Storm and fire damage)

421.

Fires (see Storm and fire damage)

Fixtures:

—Car seats made of slats ["Critic"], c90;

Comments on, 69.

—Lamps, Theft prevention, *1006.
—Philadelphia cars, Equipment details, *1073.
—Platform light for one man car, *128.
—Plush seats for one-man cars, *804.
—Seats, Head roll recovering, *1093.
—Three door trailer, Entrance fixtures, *1033.
—Three door trailer, Entrance fixtures, *1033.
—Trunstile, Electrically operated, 193.
—Two car train in Kansas City [Sanders], *402.
—Window wiper, Automatic type, *339, *1054.
—Window wiper for Detroit cars, *688.

Foreclosures (see Financial)

Fort Wayne, Ind.:
—Indiana Service Corp.:

Construction activities, 56, 787.
Employee serves 51 years, 697.
Receivership report, 781.
Traffic increases, 494.
Transformer changed from 25 to 60 cycles, 338,
Weekly pass successful [Greenland], 206,

Weekly pass successful [Greenland], 206, 389.

ort Worth, Tex.;
-Northern Texas Traction Co.;
Better service demanded, 383,
Lubrication costs reduced
*119,
Purchases Seminary line, 657,
Seven cent fare justified, 307. [Robinson].

Framingham, Mass.:

—Boston & Worcester Street Ry.:

Wage scale unchanged, 421.

France:
—Electrification projects, Extensive field [Thirlwall], 410.
—Wide electrification progressing, 607.

—Wide electrification progressing, 607.
Frsnehises:
—Aurora. Plainfield & Joliet Ry., 534.
—Bill before Washington legislature, 226.
—Bus and trackless trolley franchise granted in Rochester, N. Y., 388.
—Bus franchise controversy in Saginaw, Mich., 140, 190, 221, 299, 423, 622, 702, 859, 937, 1103.
—Bus franchise denied in Kalamazoo, 265.
—Bus franchise granted for New York City. 302.
—Bus franchise sought in Los Angeles, 226.

Bus franchise granted for New York City. 302.
Bus franchise sought in Los Angeles, 226.
Expires in Frankfort, Ky. Service discontinued, 1055.
Historical background [Humphrey], 166.
Improvements will follow new franchise, 899; Comments on, 872.
Jackson, Mich. grants, Pavement charges cease, 617.
New York City may declare forfeiture, 818.
Philadelphia bus franchise granted, 943.
Service at cost:
Buffalo proposition, 380.
Memphis, Tean., Reports surplus, 823.
Miwaukee proposition, 220, 977.
Taxation discussed [Davenport], 277.
Trackless trolley franchise granted, 423.
Westerly & Atlantic Traction Co. incorporation, 534.
Winnipeg negotiations suspended, 421.
Frederick, Md.;
Potegraph Public Service Co.

Frederick, Md.:

—Potomac Public Service Co.:

Power plant purchased, 386.

Power plant purchased, 386.

Freight and express:

—Accounting system [Heath], 522.

—Business increased, 497.

—Exchange with railroad arranged, 62.

—Fast service for perishable goods, *807.

—Joint "overnight" service popular, 728.

—Live stock transportation increasing, 1048.

—Present day problems [Greenland], 167.

—Railway versus motor truck [Wyatt], 170.

—Through routes with railroad obtained, 145.

—Traffic tripled by connection, 768.

—Fresno Cal.;

—Wages increased, 819.

Fulls:

Fuels:

—Coal commission activities, 149, 313, 502.

—Coal. Early buying urged, 989.

—Coal mines overdeveloped, Remedies suggested, 374.

374.
—Coal situation investigating committee, 890.
—Coal supply service discontinued, 611.
—Electrification to save in France [Thirlwall], 410.

-Employees' coal supply plan commended, 738.

-Locomotive consumption tests [Babcock], 770.

-Mine sample analyses unreliable, 869.

-Oil, Boilers remodeled for, *505.

-Pulverized, Boiler uses, Details, *725; Comments on, 709.

-Pulverized coal, Tests show high efficiency, 562; Comments on, 548.

Gasoline motor cars (see Motor cars, Gasoline). Gcars and pinions: —Gear case, Brace for, *1052. —Helical gcars wear well, 975. Georgia Railway & Power Co. (see Atlanta, Ga.) Georgia Ranway & Power Co. (see Atlanta, Ga.)
Germany:
—Berlin:
Cars reconstructed. *130.
Rapid transit report. 722.
Wagon for track or pavement. *49.
Zone fares and weekly pass introduced.
*760.

zone tares and weekly pass introduced, *760.

—One man cars introduced, *91.

Grafton, W. Va.:

—Tygarts Valley Traction Co.:

Annual report, 224.

Grand Rapids, Mich.:

—American Public Utilites Co.:

Reorganization, 261.

—Commonwealth Power, Railway & Light Co.:

Financial adustment, 61.

—Grand Rapids Ry.:

Annual report, 578.

Bus operation commenced, 1104.

Car windnw screens, Cleaning of, *129.

Paint spraying, Portable compressor for,

*124.

Wage increase sought, 819.

"124.
Wage increase sought, 819.

—United Light & Railways Co.:
Stock issue announced, 862.
Stock sold to customers, 102.
Grays Harbor Railway & Light Co. (see Aberdeen, Wash.)

deen, Wash.)

Great Britain:

-Edinburgh electric cars. *75.

-Fares reduced in London, 186.

-Glasgow to purchase and electrify subway.
186, 1060.

-Letters from, 303, 492, 698, 779, 940, 1020.

1060.

-Liverpool, Glasgow and Edinburgh transportation compared [Turner], 1039.

-London:

Brighton & South Coast Ry. 12 years record. 367, 1092.

London underground extension program, 58, 1060.

Metropolitan locomotive reconstructed.

*954.

-London subway cars attractive, *751; Com-

London subway ears attractive, *751; Comments on, 749, 832.
 Prince of Wales honorary president of Institute of Transport, 1090.
 Trailers in narrow streets failure in London, 186.

Green Bay, Wis.:

—Wisconsin Public Service Co.:

Bay Shore Ry, purchase price fixed, 263.

Stock issue planned, 621.

Guelph, Ont., Can.:

—Hydro-Electric Power Commission of Ontario:
Hydro radial scheme defeated, 139.
Toronto radials voted down, 56.

Н

Hamilton, Ont., Can.:

—Dominion Power & Transmission Co.:

Annual report, 496.

—Hamilton & Dundas Street Ry.:

Service discontinued, 188.

Service discontinued, 188.

Heavy electric traction (see also Locomotives):
—Catenary insulators, Factors governing cost of [Austin], *209.
—Electrification largely a financial problem [Steinmetz], 855.
—Electrification of railroads in New York City required, 976.
—European systems, Observations on [Potter], *292.
—Encoder Communication of the control of the contr

-French projects, Equipment notes [Thirlwall], 410.

—Italian electrification successful, *409.
—Japanese electrification progressing, *917.
—Kanasa, Proposed electrification, 697.
—Locomotive control, A.C. systems [Döry], *1999.
—Locomotives of N. Y., N. H., & H. R.R. [Clardy], 412.

Midi electrification progressing, 607.

Muscle Shoals line to be electrified, 296.

New Zealand electrification progressing, 91, 1085. -Progress during 1922 outlined, 19; Comments

on, 4.

—Railroad electrification in St. Louis, Mo., sought, 978.

-Record of results on English system, 1092.
-Service records of American railroads [Smith],

-44.
-Service record of twelve years, 367,
-South African system planned, 107.
-Southern Pacific R.R. electric service, *633,
-Specification of A.R.E.A., 523,
-Substation, Remote control, Non-overloadable,
*873; Comments on, 871.

*873; Comments on, 871.

Swiss electrification speeded up, 605.

—Temiskaming & Northern Ontario Ry, electrification recommended, 219.

—Texas electrifications considered, 662.

—Transportation improved by electrification, Comments on, 4.

—Virginian Ry, to electrify, 777; Comments on, 749.

Highwood, Iil.:

—Chicago, North Shore & Miiwaukee R.R.:

Americanization educational program anccessful, 373; [Goodsell], 514.

Comfortable cars pay [Thompson], 516.

Financial plans, Changes in, 262, 386.

Interurban cars, Design detalls, *959,
Safety cars, Designed for comfort, *804.

Traffic solicitation effective [Shappert], 569.

Holyoke, Mass.:
—Holyoke Street Ry.:
Sleet cutter part of car equipment, 255.
Snow removal organization, 331.

Houghton, Mich.:

—Houghton County Traction Co.:

Schedule clock dials over sidewalk, •650,

Schedule clock dials over sidewalk, *650, Houston, Tex.;

—Houston Elec. Co:

Fare controversy, 1194,

Jitney competition to be removed, 864, 906,

—Rerouting plan satisfactory, 104,

Hudson & Manhattan R.R. (see New York City),

Hydro-Electric Power Commission of Ontario (see Gurlph, Ont., Can.)

I

Hlinois Electric Railway Assn.;

—Annual meeting;

Papers and discussion, 514,
Program, 253, 416.

Illinois, State of:
-Public utilities

Illinois, State of:

—Public utilities co-operate in educational plans, 960
—Supreme Court rules against bus competition, 1103.
Illinois Traction System (see Peoria, Ill.)

Indiana Claim Agents' Assn.:
—Winter meeting, 253.

Indiana. Columbus & Eastern Traction Co. (see Springfield, O.)

Springfield, 0.1
Indianapolis, Ind.:
—Indianapolis & Cincinnati Traction Co.:
—Cincinnati Inop connection sought, 976.
Single phase replaced by D.C., Extension
planned, 858, *913; Comments on, 1071.
—Indianapolis Street Ry.;
Annual report, 700.
—Collision due to slippery tracks, *343.

Consion due to suppery tracks, *343, --Interstate Public Service Co.;
Annuai report, 659,
Bond issus permit sought, 224,
Crossing signal with motorman's pliot
light, *1047.

Terre Haute, Indianapolis & Eastern Trac-tion Co.; Annual report, 629.

Annual report, 629, Accounting, Use of machines for [Peery], 413.

Improvements planned, 576. Live stock transportation, 345. Weekly pass successful. 428; [Walker], c1986.

Indiana Public Utility Assn.:

—Annual meeting:
Beports and discussions, 212.
Indiana Service Corp. (see Fort Wayne, Ind.)

Indiana. State of:

—Municipal ownership bill in legislature, 302.

—Trolley service suffers from wind storm, 533.

Information bureaus of utilities (see Public, Relations with).

Insulating materials:
—Catenary insulators, Factors governing cost of [Austin]. *209.
—Strain insulators, Porcelain replaces wood, 572.

Haurance:
—Automobile, Compulsory insurance, 600.
—Employees insurance plan, 218, 560; [Kavanach], 1089.
—Utility insurance, Comments on, 1072.

Interborough Rapid Transit Co. (see New York City)

Internationale Strassenbahn und Kleinbahn Verein:
—Annual convention:

Program, 1001.
International Ry (see Ituffalo, N. Y)
Interstate Public Service Co. (see Indianapolis,

Interurban cars (see Cars, Interurban),

Interurban cars (see Cars, Interurban),
Interurban railways:
—Cars, all-steel, Details of, *561,
—Cattle hauling criticized in Indiana, 345,
—Cincinnatt line to run into Dixle Terminal,
344
—Sity tracks, contract for usage, 882
—Italias Denton line to be electrified, 898
—Italias Terrell line 185 *218; (Fowler! *50)
—Fares nutside city limits out subject to ordinance, 984
—Italia, high-speed cars reduce expenditure
[Gunn] 135.

—Lima & Deflance ity Co formed, 530 —New Jersey canal bed may be used for 820 —Operation not to be resumed in Springfield, O., 187.

-Parlier car *ervice started B84
-Present day problems [Greenland], 16
-Bao Francisco East Bay system, *633,
-Bervice desired Comments on, 632
-Shore Line Ry operation planned, 29
-Shore phase replaced by D C, 858

J

Jackson, Mich.:
-Michigan R.R.: Through routes with Pêre Marquette B.R. obtained, 145.

obtained, 145.

Micbigan United Rys.:
Bus project voted down in Kalamazoo, 265.
Foreclosure ordered, 904.
Franchise with pavement charge release voted, 617.
One-man cars upheld in Laosing, 865.
Jacksonville, Fla.:

Jacksonville Traction Co.:
Extension to be financed by town, 859.

Japan:

-Railway electrification progressing, *917.

-Tokin subway contract let to New York firm, 300.

Jersey Central Traction Co. (see Keyport, N. J.)

Jersey Central Traction Co. (see may Jersey City, N. J.:

—United Ballways Investment Co.:
Reorganization proposed, 424.
Jitneys (see Motor Busca).
Johnstown, Pa.:

—Johnstown Traction Co.:
One man cars permitted, 944.

Joliet, Ili.;

—Aurora, Plainfield & Joliet Ry.;

Franchise granted, Paving question settled,

K

Kansas City, Mo.:

Kansas City, Mo.:

—Kansas City, Clay County & St. Joseph Ry.:

Radio reception on moving car, 240.

—Kansas City Rys.:

Annual report 961.

Elevated reconstruction ordered, 888.

Elevated structure abandoned, 304.

Fare extension granted, 864.

Hand brake, Ratchet type, *255.

Power generation cost reduced [Druen], *439; Comments on, 437.

Rent for use of viaduct paid, 224.

Train, Two car, Details of [Sanders], *402.

—Missouri & Kansas Railway & Terminal Co.:

Charter granted, 98.

—Terminal and office building, Details, *599.

Kansas, State of:

Kansas, State of:
—Industrial court act illegal, 1058.

-Industrial court act freesh. Your Kenosha, Wis.:

-Wisconsin Gas & Electric Co.:
Bond Issue to purchase property, 982.

Kenlucky Traction & Terminal Co. (see Lexington, Ky.).

Keyport, N. J.;

—Jersey Central Traction Co.;

Abandonment of entire system sought, 982,
Fare cut to increase revenue, 64.

Labor (see also Employees):

Labor (see also Employees):

—Amalgamated Association of Street & Electric Railway Employees of America:

Utica meeting marks time, 239.

—Boston and Philadelphia costs compared 347; [Dana], c489.

—Coal miners too plentiful, 374.

—Coal miners, unionization ruinous, 812.

—Labor saving machinery for railways, Comments on, 436.

Lackawanna & Wyoning Valley R.R., (see Scranton, Pa.).

Lake Shore Electric Ry, (see Cleveland, O.)

Legal:
—Arbitration as aubstitute for littration urged, 577.

-Award against Clark & Co., sustained in Columbus, 577. -Bus competition illegal in Illinois, 1103. -Canal title given to railway by supreme court, 342.

-Chicago caunot take profits from railway, 738, -Commission order reducing telephone rates in Missouri overrulal by Supreme Court, 203

-Injunction in Schenectady permits car oper-ation 900 ation, 900.

Jitney presecution in Buffalo. *879

-Kansas City required to maintain viaduct, 888.

case.

--Legal notes, 296, 310, 624, 1066,

--Municipal fare control restricted to city
itmits in Georgia case, 984

--Payement assessment to Durham, N.C., upheld by U. S. Supreme Court, 312,

--Wage fising law illegal, 1058.

Legislation for railways:
—Carmen's aix day week, Bili to legislature,

—319
—Cincinnati connection bill passes Ilmuse, 577,
—Missouri stop light bill killed, 576
—Property assessment for transit improvements,
Bill introduced in Pennsylvania, 696,
—Review of proposed legislation, 100,
Lehigh Valley Transit Co. (see Allentown, Pa.)

Lims. 0:

-Ohio Electric Ry.:

Lima-Toledo line sale held up, 621.

-Western Ohio Ry.:

Interurban cars, Light weight reduces cost
[Gunn], 135.

Little Rock, Ark.:

-Little Rock Rallway & Electric Co.:

Purchased by the Arkansas Central Power
Co., 781.

Living costs:

Living costs:

—Bureau of Labor report, 880.

—Cleveland study, 735.

—Conspectus of indexes, 187, 348, 539, 749, 1002.

—"Living wage" Labor board report, 884, 1048.

Loading platforms (see Terminals and Waiting Stations).

Stations).

Locomotives:

- Electric:

Control systems for A.C. [Döry], *199.

Equipment of the N. Y., N. II. & H. R.R.

[Clardy], 412.

Japanese cquipment, *917.

Orders of 1922 tabulated, 41.

Reconstructed, Details, *954.

Spanish shipment, *667.

European calling stock, Observations on [Pot-

European rolling stock, Observations on [Potter], 292.
 Free consumption tests [Babcock], 770.

London (see Great Britain).

Long Island City:

— New York & Queens County Ry.:

Moran type transfer adopted, 906,

Los Angeles, Cal.:

— Bus lines proposed to parallel railway, 226, Los A —Bus h. 265

—Hearing by I.C.C. on terminal Issue promised, 344.

344.

Los Angeles Ry.:

Armature banding machine, *654.

Buses and extensions planned, 189, 307, 497, 534, 542, *575, 641, 691, 698, 735, 779, 805, 984.

Car routing reorganized, 663, "Conriesy week," 782.

Employees merit system, Details of [Jefferyl, 721, Traffic police, Co-operation with, 422, Training car [Jefferyl, *1037, Unification of Ilollywood lines suggested, 389, Valuation proposed as step in unification.

Valuation proposed as step in unification, 387, 426.
Wage increase announced, 738.

Wage increase announced, 738.
acific Electric Ry.:
Abandonment of Pomona lines sought, 258.
Accident map used in safety work, 905.
Baliast estimating for paved streets, 338.
Bridge as part of flood control system, *730.
Buses and extensions planned, 189, 307,
497, 534, 542, *575, 641, 661, 608.
735, 779, 865, 984.
Cars, Ali-steel subucban, Details of, *561.
Crossing signal, *84.
llydraulic press, Shop constructed [Elliott],
*484.

Valuation proposed as step in unification, 387, 426.
Terminal order before I.C.C. for consideration, 220.

Louisville Ky.:

—Louisville Ry.:

Annual report, 386.

Bus service to be started, 944, 1104.
Car demollahed at grade crossing, *185, *243. Carhouse burned, 140, Carhouse employees compete for dinner, 603,

603. Dividend declared, 539. "Safrty chairman" duties of [Funk], 213. Utilities bureau partially supported by, 902. Wheel remnyal equipment [Squier], *447; Comments on, 437.

Lubrication;
—Charted schedule saves bearings [Dalgieish],
•235.

-Cost reduced. Details of system used [Robin-son], *119; Comments on, 116 -Gear grease, Paper cartridges 815, --Motors, Difficulties enconotered [Davis], 207,

-Motors, Packing waste [Clark], 175; Discussed by N.Y.E.H.A., 207.

-Oil purification, Centeffugal separator, *471; Comments on, 430.

-Trolley wheels and sweeper brooms, 333.

-Waste saturation cuts oil consumption, *676; Correction, 878.

M

Madison, Wis.:
—Madison Rys.:
Pavement 1965.

relief ends fare controversy,

Maintenance practice (see also Repair shop

905.

Maintenance practice (see also Repair shop practice):

—Affected by storage conditions, *993; Comments on, 991.

—Car cleaning in Binghamton, 338.

—Car cleaning, clear story windows, New York & Harlem R.R., 419.

—Car inspection and repairing [Dalgleish], *235.

—Car painting (see Painting).

—Car window screens, cleaning of, *129.

—Controller drums repaired, *128.

—Cost reduced by metering car energy, 1093.

—Expense reduction notes [Porter], 931.

—Factor in public relations, Comments on, 1072.

—Few reserve cars, Problem solved, 1603.

—Lamp replacements decreased, 482.

—Pavement [Elliott], *94.

—Poles (see Overhead contact system).

—Railway motors [Dean], *111.

—Seat head roll recovering, *1093.

—Signal maintenance [Charters], *468.

—Track shop "kinks" [Wilder], *814.

—Transformer oil dehydrating, *471; Comments on, 436.

—Trolley wheel and sweeper broom lubrication, 333.

—Trolley wire should not be nicked, 126.

Management:

—Rusiness education best preparation for *297.

Management:
—Business education best preparation for, 297.
—Company publications, Merits of [Baxter], 525.

-Co-operation, How to seeure it [Pellissier].

251

Courses provided in colleges. 966.

Employees' trial board successful, 881.

Foreman's relation to men [Buffel, 137.

"Human maintenance" [Coffey], 1650; Comments on, 1031.

"Human talents," Comments on, 547.

Mental alertness, Comments on, 109.

Modernizing service, Some objectives [Budd], 5

5.

Operation suggestions, 20.

Problems confronted [Sawyer], 518.

Public eo-operation, How to obtain, Comments on, 395.

Public sentiment, Comments on, 594.

Salaries low, Comments on, 196.

Service, suggestions for improvements of [Coates], 7.

"Stops the leaks," 485.

Success, Requisites for, Comments ou, 151,

Talks on, 415.

Traction heads should be accessible to public [Elwell], 275.

Training engineers for [Budd], 515.

Wide acquaintance helps, Comments on, 503.

Manhattan Bridge, Three Cent Line (see Brooklyn, N. Y.).

Manhattan & Queens Traction Corp. (see New

Manhsttan & Queens Traction Corp. (see New York City),

Market conditions:

—Automotive equipment, 1022 sales to railways tabulated, 43.

—Car and equipment demands heavy, 231.

—Car sales, 314, 355, 393, *433, 592.

—Car sales during 1022, increase, *35; Comments on, 1.

-Cement, 909, -Coal. 67, 167, 149, 193, 231, 266, 313, 355, 393, 433, 501, 545, 587, 629, 668, 707, 747, 787, 829, 869, 969, 947, 989, 1629, 1069, 1106.

-Coal market unstable, Reasons and remedies, 374.
-Copper, 963.
-Foreign trade, 561, 947.
-Lumber, 989.
-Manufacturing, 1922 figures, 67.

-Msnufacturing, 1922 figures, 67,
-Metals, 67, 107, 149, 193, 231, 269, 312, 355, 393, 433, 501, 545, 587, 629, 668, 707, 747, 787, 829, 869, 969, 947, 989, 1029, 1069, 1166,
-Rails, 747,
-Railway materials, 67, 107, 149, 193, 231, 269, 313, 355, 393, 433, 561, 545, 587, 629, 668, 707, 747, 787, 829, 869, 969, 947, 989, 1029, 1069, 1100,
-Staple commodities, World stock, 869, -Tabulated over teu year period, *23, Market Street Ry, feee San Francisco, Cal.)
Maryland Utilities Assn.:
-Organization meeting, 375.

—Organization meeting, 375.
Mason City. Ia.:
—Mason City & Clear Lake R.R.:
Track life increased by joint boosters, 131.
Massachusetts, State of:
—Buses under railway control before commission, 227, 497.
—Excise tax, relief sought by railways, 59.
—Superpower bill passed, 727.
—Tranaportation district recommended to legislature, 98.
Maynard Mass:

Maynard, Mass.:

—Concord, Hudson & Maynard Street Ry.:

Replaced by buses, 428.

Memphis, Tenn.:

—Memphis Street Ry.:

Accidents decreased, 616.

Annual report, 823.

Commission valuation protested by city, 309.

Receivership lifted, 790. Wages raised, strike ends, 695.

Menomince, Mich.:

Menomince & Marinette Light & Traction Co.:
Franchise extension sought, 818.

Officers elected, 537.

Officers elected, 537.

Merchandising transportation (see also Publicity and Traffic stimulation).

—Features stressed in Europe [Kappeyne], *367.

—Methods of handling [Sanders], 794.

—Railway salesmanship, Comments on, 70.

—Sale of the ride [Jackson], 517.

—'Selling" the one-man ear, *766; Comments on, 749.

—Service important [Meriwether], 932.

—Traffic solicitation effective [Shappert], 569.

—Trainmen sell transportation, 715.

—What sells transportation [Hungerford], 1087.

Michigan City Ind.:

Who is an City, Ind.:

-Chicago, Lake Shore & South Bend Ry.:
Wood pole and the treatment [George],
*1002.

Michigan R.R. (see Jackson, Mich.)

Michigan, State of:
—Commission authority, Bill increases, 820.
Michigan United Rys. (see Jackson Mich.).
Milwaukee Northern Ry. (see Cedarburg, Wis.)

Michigan United Rys. (see Jackson Mich.).
Milwaukee Northern Ry. (see Cedarburg, Wis.)
Milwaukee Wis.;
—Milwaukee Electric Railway & Light Co.:
Annual Report, 495.
Boms for energy saving, 927.
Eus line absorbed, Rates reduced, Weekly pass announced, 265.
Bus service started, 824.
Headway record checking method, *1078.
Pulverized ful gives high efficiency, 562.
Purchase proposal explained, 977.
Secrity sales, Advertising helped, 700.
Service at cost proposed, 220.
Special track, Chrome-nickel used [Hibbard], *461.
[Hibbard], *461.
Trackless trolley permits sought, 190.
Traffic count made by conductors, *955.
Trainmen's wages increased, 380.
Train, two-car articulated, Economical ILucasl, 880.
Minn.;

Train, two-car arteristed, Economical [Lucas], c809.

Mineapolis, Minn.:

—Mineapolis Street Ry.:
Fare hearing and valuation resumed, 739.
Valuation case decided, 261.

St. Paul City Ry.:
Fare hearing and valuation resumed, 739.

—Twin City Rapid Transit Co.:
Annual report, 224.
Crossing signs, *338.
Wage demands refused, 1058.
Wheel removal equipment [Squier], *447;
Comments on, 437.

Missouri Association of Public Utilities:
—Annual convention:
Proceedings, 1015.

Missouri & Kansas Railway & Terminal Co.
(see Kansas City Mo.)

Mobile, Ala.:

(see Kansas City Mo.)

Mobile, Ala.;

—Mobile Light & R.R. Co.; Bond issue announced, 942.

Monong ahela Power & Railway Co. (see Fairmont, W. Vn.)

Montreal, Que., Can.;

—Montreal Tramways;

Cement bag records [Genest], *483.

Engineering department cost accounting [Genest], *755, *797.

Traffic studies to be made, 824.

—Montreal Tramways & Power Co.;

Annual report, 1160.

Annual report, 1160.

Morris County Traction Co. (see Morristown, N. J.)

Morristown, N. J.:

—Morris County Traction Co.:

Bus injunction obtained, 857.

Motor busea (see also Automobiles.)

—Area per passenger, America and Great Britain compared [Turner], 957; Comments on, 949.

Buffale permit denied, 824.

tain compared [Turner], 957; Comments on, 949.

—Buffalo permit denied, 824.

—Buffalo trolley replacement suggested, 429.

—Competition with railways unsound policy, Comments on, 670.

—Destructive competition lessened [Emmons], 283.

—Double truck machine on market, 107. —Field for [Elwell], 275; [McCarter], 284. —Franchises (see Franchises): —Interurban use [Seely], 169.

-Franchises (see Franchises):
-Interurban use [Seely], 169.
-Jitney situation:
Albany, N. Y., 979.
Birmingham, Ala., Jitneys eliminated, 857, 985.
Buffalo, N. Y., 62, 536, *789, 978, 1065.
Commission report on 14 etties, 802.
Detroit jitneys flourish, 429, 938, 984.
Houston, Tex. competition to be removed, 864, 906.
Jitney regulation provision in improvement program, 897.
Malden, Mass., 190, 356, 429.
Norfolk, Va., Newspaper comments on, 783.
Parallel operation with trolley lines stopped, Comments on, 358.
Railways preferred by Mayor of Portland, Ore., 905.
Richmond Va., situation analyzed, *397.
Schenectady, N. Y., 979.
Service improvements await jitney restriction, 985.
Terre Haute restrictions, 1025.
Traffic decrease caused by, 383.
Youngstown, O., 617.

Abbreviations: *Illustrated. c Communications. READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

Motor buses (see also Automobiles) (Continued):

—Liverpool, Glasgow and Edinburgh, Report
on [Turner], 1039.

—Los Angeles board recommends, 641.

—Louisville, Ky., Service to be started, 944.

—New York City exhibit, 1026.

—New York, London, Paris and Berlin traffic
compared [Turner], 779.

—New York street cars cannot be replaced by
[Beeler], *87.

—Ohio commission to regulate 782

[Beeler], *87.

Ohio commission to regulate, 782.

Operation costs, 1089.

Operation statistics, 384.

Railway preferable to bus line, 859.

Regulation by states needed [Shanahan], 6.

Regulation and taxation urged in Iowa, 298.

Regulation of as common carriers [Fenner], 298; Discussed by N. Y. E. R. A., 207.

Replacement by railway voted in Bridgeton, N. J., 583.

Replace railway, 220, 428, 943, 1096.

San Francisco plans route, 104.

Substitution for railways, Comments on, 590.

Supplementary to railways:

Supplementary to railways:

Akron, O., trial [Blinn], 165; Comments on, 152.
Cauton, O., Service proposed, 817.
Connecticut Co. extends service, 984.
Deficit shared by city, 551.
Eastern Massachusetts Street Ry. plans, 1024.

1024.

Stat St. Louis. Ill., to have service, 145.
Grand Rapids Ry. introduces, 1104.
Indiana, Columbus & Eastern Traction Co.
introduces, 663.
Los Angeles railways unite to seek bus
franchise. 189, 307, 497, 534, 542,
*575, 641, 661, 698, 735, 779, 865,
984.

Louisville Ry. starts bus line, 1104.
Malden, Mass., rights sought, 190, 227, 350, 429.
Massachusetts Commission authorizes, 497.
Milwaukee Electric Railway & Light Co.
buys competing line, 265, 824.

ouys competing line, 205, 824. New Jersey rights sought, 623. New York State Rys, orders buses, 742. New York State Rys seek rights, 825. Pasadena settlement near, 189. Pennsylvania-Ohio Electric Co. seeks permit, 825.

Replace trolleys which interferred with scientific apparatus, 497.
Rochester, N. Y., franchise granted, 288.
Saginaw proposal, 146, 190, 221, 299, 423, 622, 792, 859, 937, 1103.

Schenectady operation announced. 661. Short haul routes approved in Providence, 301. 388; Comments on, 632. Springfield, Mass. to have service, 145, 309.

Texas bill vetoed, 617.
Tolede nlans, 189, 388.
Transportation problem solved by [Davis], 1035.
Youngstown lines commence operation, 542, 865.

Motors:

otors: Armature, Baking ovens [Dean], *684. Armature, banding, Tin replaces solder, 573. Armature eoils, Dipping and baking [Dean], *652.

-652.

—Armature coils cleaned by boiling, 377.

—Armature cores reclaimed, *180.

—Armature dipping pays [Dean], *895.

—Armature maintenance points, *841.

—Armature on the ground side saves repairs [Osborn], 650.

—Armature shafts straightened, *378.

—Brushes, Shunts for [Dean], *1010.

—Brushbolders.

Brushes, Shunts for [Dean], *1010.

Brushholders:
Closed front type, *487.
Contact tips, Copper vs. phasphor bronze
[Dean], *485.
Contact tips, Flat vs. rounded, *330.
Interchangeable type, *217.
Twenty-four adjusting points *1095.

—Improvements during 1922 outlined, 14.
—Jig for reboring cases, *335.

—Lubrication difficulties [Davis], 207.
—Lubrication, Packing waste [Clark], 175.
—Maintenance practice suggestions [Dean], *111.

—Renairs (see Repair shop practice):

-Repairs (see Repair shop practice): -Rewound with flat wire, 1010. -Service record good through bard winter. 775.

-Shop motor, Stamped rotor winding, *134.
-Testing routins [Dean], *318.

Motor trucks:

—Crane for mounting on truck. *256.

—Regulation and taxation urged in Iowa, 298.

Wagen for track or pavement, *4
Moving pictures (see Publicity).

Moving pictures (see Publicity).

Municipal ownership:
—Ashtabula, O., experiment successful, 261, 781.
—Bus ownership bill before Washington legislature, 220.
—Co-operation proposed in Buffalo, 380.
—Critical period ahead, Comments on 872.
—Critical period in San Francisco, 823.
—"Customer ownership" preferable to [Hurley], 213.

Debt limit increase sought to provide for, 383.
Detroit Municinal Rv., Annual report 863.
Detroit Municipal Rv., Report on, 371, 568, 647; Comments on 503.

Motors (Continued):
—Glasgow, Scotland, to purchase subway, 186, 1960.

1960.

-Hollywood problem may lead to, 380.

-Indiana bill introduced, 302.

-London, Paris and Berlin situation [Turner].

153.

Milwaukee proposal, 220.

Municipally owned, Privately operated system proposed in South Jacksonville, Fla., 859.

New York City cannot fluance traction system, 541.

New York State bill includes provisions for 57, 130, 184, 258, 290, 342, 381, 491, 535, 415, 417, 455, 738, 818; Comments on, 2, 272, 790, 978.

-Philadelphia plans city owned privately operated system, 220, *382, 490, 615, 696, 858,

-St John, N. B., Can., terms may be arbitrated, 143.
-San Francisco lines show loss, 384.
-Support from general tax fund illegal in Seattle, 622.

-Terooto conference:
Program, 1016
-Toronto lty, to receive payment from city, 225.

225. -Unsatisfactory [Emmons], 283.

Unsatisfactory | Ellimons | 1.505.
 Muskegon, Mich.;
 Muskegon Traction & Lighting Co.;
 Depreciation of 4 per cent allowed, 261.
 Earnings to pay for improvements, 224.
 Extra pay for politeness, 943.

N

Nashville, Tenn.:

—Nashville Railway & Light Co.:

Accident prevention awards, 141.

Commission ruling on maintenance and appraisal, 1956.

Safety campaign progressing, 702.

National Electric Light Assn.:

—Annual convention:

Officers elected, 971.

Papers and proceedings, 967.

National Safety Council:

—Committee appointmenta, 92.

—Electric Railway Section;

Executive committee activities, 252.

Newark, N. J.:

Newark, N. J.:

—Public Service Ry.:

Annual report, 658.

Fus rights soogbt, 623.

Capital structure changes proposed, 62.

Commission valuation protested, 63,

1924. 620 398.

Commission valuation protested, 63, 398, 1924.

Economy meters ordered, 313.
Financial system changes, 5:19.
Organization changes, 5:19.
Organization changes, 3:48.
Power distribution system and its maintenance [Rosevear], *4:53.
Public meetings with good resuits [McCarter], 286.
Repeater signsls for one man ears, *0:37.
Stop sign on safety car door, *6:13.
Tax suit wan, 26:3
Wage increase with one day off per week sought, 8:10.
—Rapid transit in canal brd proposed, 8:20.
—Traffic congestion demands remedy, 3:89.
New Bedirid, Mass.:
—Union Steect Ry.:
Accident causes [Wildel], 8:90.
New Brighton, Ps:
—Beaver Valley Traction Co.:
Azin removal method, 9:74.
Cars bought from Pittsburgh Ry. 184.
Fire apparatus, Stripes lead to, 8:54.
Rubbish disposal, Furnace for, *10:12.
Service buttons for rmployees, 18:9.
Wage agreement reached, 0:78.
Weekly pass successful [Boyce], 2:06.
New Brunswick Power Co. (see St Johns, N. B., Can.)
Newburgh, N. Y.:
—Orango County Traction Co:

Can)
Newburgh, N. Y.;
—Orango County Traction Co;
Ilitaes replace railway, 220, 662.
New England Street Railway Club;
—Aonual meeting;
Program, 528.
Speakers aonounced, 416.
—February meeting;
Program, 214, 251
—Joint meeting with A E R A company section, 1938.

New Haven, Conn.;

Connecticut Co.;
Bus service extended, B84
Coal plan commended, 738
Fare reduction voted, 1100
Five cent fare abolished in Bridgeport, 583
Five cent fare experiment in Norwalk, 62, One-man two man cars to be used, 400 Restoration to owners suggested by legis-lature, 221 Truck overhauling methods, *833, Com-ments on 831 Turbine to be installed, 231 Wages increase demanded, 800, 1014, 1000

New Jersey, State of,
—Commission law changes recommended, 98
—Fare reduction bill defeated, 623
—Utilities criticized by Oovernor, 131

New Orleans, La.:

New Orleans Public Service Inc.:

Beeler report discussed, 866, 1618, 1098.
Elimination of lines suggested, 265.
Oct.-Nov.-Dec. report, 263.

Pavement, Granite block, asphalt covered, 481.
Report, Six months', 781.
September report, 130.
Stock off exchange list, 982.
System stinded, Sweeping changes recommended, *716, 885, 900, *925, *961; 1043, 1079; Comments on, 710.
New York City (see also Brooklyn, N. Y.)

1043, 1979; Comments on, 710.

New York City (see also Brooklyn, N. Y.).

—Alabama Traction, Light & Power Co.:

Preferred stock payment plan, 142.

—Buses cannot replace street cars (Beeler), *87.

—Buse permit given for Fsr Rockaway line, 302.

—City cannot finance traction plan, 541.

—Eighth Avenue R.R.:

Armature shafts straightened, Machine for, *378.

Babbitting line, *410.

Armature shaits straightened, Machine tot,
*378.
Babbitting ligs, *419.
Bot threading machine useful, *531.
Compressor evlinders rebored, *334.
-Federal Light & Traction Co.:
St. John, N. B., Can, property to be rehabilitated, 699.
-Hudson & Manhattan R.R.:
Annual report, 660.

Annual report, 660.

Interborough Rapid Tranait Co.:
Annual report, 60.
Boiler equipment increased, 1087.
Car maintenance, Piece-work system, *443:
Comments on, 436.
December report, 225.
Elevated system improvements, 662, 703, 742: Comments on, 670.
January report, 426.
Lighting costa, 457.
Reorganization completed, 102.
Transil commission report on, 493.
Turnstiles, Electrically operated, 193.
Wage agreement expires soon, 1017.

—Manhattan & Onesa Traction Corp.

Trick pedesial reinforcement, who was a construction of the constr

New York, Weatchester & Rosion Ry.: Trolley wire, Copper replaces steel, 572. Truck overhauling metbods, *833, Coments on, 831.

ments on, 831.

-North American Co.:
Annual report, 424.
Control of Wisconsin Traction, Light, Heat
& Power Co. acquired, 942.
November report, 187,
Stock dividend declared, 349.

-November transit reports show profit, 264.

-Queensborough tunnel ahead of schedule,

*977.

- Satety campaign, 943.

- Sechedules visualized on board, *503.

- Schedules visualized on board, *503.

Schedules visualized on board, who.

-Staten Island Midland Ry.:

Municipal operation expensive, 016.

-Subway construction costs, 1037.

-Third Avenue Ry.:

Wheel and axic shap, Efficient arrangement [Hochette], *215.

"Wirel wireless" for ear communication, 554.

-Transit Commission plan favored by Merchants

Assn., 183.

—Transit Commission report, 90, 493.

—Transit Commission report, 90, 493.

—Transit Commission seeks co-operation, 857.

—Transit "home rule" possibility, 57, 134, 184, 958, 299, 342, 381, 491, 535, 615, 617, 655, 738, 818, 978; Comments on, 2, 272, 790.

-Transportation compared with European cities [Turner], *79, 153; Comments on, 79 -United Gas & Electric Corp.; Reorganization, Capital reduction, 739

Reorganization, Capital reduction, Gew York Electric Ratiway Association;
-Midwinter meeting;
Papers and discussions, 175, 206
Program, 93, 174
-Summer meeting,
Papers and proceedings, 1487
Program, 1016,
Y. N. H. & H. R.;
-Ratiway substituties during well, 620
ew York & Queens County By (see 1stand City)

New York, State of:

—"Arbitration educational week," 577.

—Bills affecting utilities before legislature, 185.
—Commission blames city anthorities for poor transit in Buffalo, 257.

—Legislative committees on public utilities, Personnel, 97.

—Municipal control of utilities, 57, 136, 184, 258, 296, 342, 381, 491, 535, 615, 617, 135, 738, 818, 978; Comments on, 2, 272, 790.

—Paving charges a local issue recommended, 184,
—Platform employees special police, bill provides for, 650.

—Public utilities commission report to legislature, 99.

—Railways operate at loss, 188.
—Traction bills signed by governor, 938.
—Transit Commission:

Bus possibilities in New York City, Report on [Beeler], 87.

Co-operation of New York City sought, 857.

Liverpool, Glasgow and Edinburch transportation studied ITurner1, 1039.

New York City bus franchise granted, 302.

New York State Rys. (see Rochester, N. Y.)

Norfolk, Ya.:

New York State Rys. (see Rochester, N. Y.)

New York State Rys. (see Rochester, N. Y.)
Norfolk, Ya.;
—Jitney situation, Press comments on, 783.
North American Co. (see New York City).
North Branch Transit Co. (see Bloomsburg, Pa.)
Northern Ohio Traction & Light Co. (see Akron, Ohio).
Northern States Power Co. (see Fargo, N. D.)
Norwich, Conn.;
—Shore Line Electric Ry.;
Operation planned, 220, 346.
Safety first presented to school children, 703.

0

Oakland, Cal.:
—San Francisco-Oakland Terminal Rys.:
Fare discrimination charged, 497.
Foreclnsure oriered, 822, 1062, 1100.
Ferryboat delivered, 696.

Ogden, Utah:
—Utah-Idsho Central R. R.:
Annual report, 741.
Ohio Electric Ry. (see Lima, O.).

Ohio Electric Ry. (see Lima, O.).
Ohio, State of:
—Commission attacked by Governor, 695.
—Commission to regulate buses, 782.
—Commission to Public Utility Information active, 59.
—Tovernight" joint freight service popular, 728.
—Power program on large scale, 344.
Oil City, Pa.:
—Citizens Traction Co.:
—Wages increased, 779.
Oklahoma Public Utilities Assn.:
—Annual meeting:
—Papers, 526.
Proceedings, 527.
Olean, N. Y.:

Proceedings, 527.

Olean, N. Y.:

—Olean, Bradford & Salamanca Ry.:

Annul meeting, 225.

Employees' organization betters spirit, 645.

Omaha, Neb.:

—Omaha & Council Binfis Street Ry.:

Pamphiet, "street car topics," 1057.

Omnibuses (see Motor buses).

One-man cars (see Cars, One-man).

One-man cars (see Cars, One-man).

Operating records and costs (see also Statistics):

—Airbrake reservoir test report form [Bolt].

*851.

—Bas vs. railway [Beeler], *87.

—Capital Traction Co., *235.

—Car hour record, *531.

—Electric furnace operating record, *671; Comments on, 469.

—Employees' discipline records, 881.

—Employees' merit records [Jeffery], 721.

—Expense accounts, Subdividing system [Elliott], 1045.

- Expense accounts. Subdividing system [FarHott], 1045.

- Headway record checking method, *1078.

- Labor costs [Dana], c480.

- Light-weight, High-apex] cars reduce expenditure [Gunn1, 135.

- Lubrication costs reduced [Robinson], *119;

Comments on, 110.

- Maintenance costs, 508; Comments on, 503.

- Maintenance records speed repairs, 1963.

- Power distribution maintenance record system
[Rosevear], *453.

- Power distribution maintenance record system
[Rosevear], *453.

- Power station operating records [Druen],

- *430; Comments on, 437.

- Repair shop costs, Piece-work basis, *443;

Comments on, 436.

- Savines expected from operating improvements, *307.

- Signal operation record [Charters], *468.

- Signal operation record [Charters], *470.

- Track costs analysed, 1007.

Operating records and costs (see also Statistics)

(Continued):

—Traffic count made by conductors, *955.

—Traffic graph made on street, *638.

—Traffic study system, *951.

Orange County Traction Co. (see Newburgh, N. Y.).

—Traffic study system, *951.
Orange County Traction Co. (see Newburgh, N. Y.).
Orange, Tex.:
—Orange Light & Water Co.:
—Trackless trolley franchise granted, 423.
Ottawa Ont., Can.:
—Ottawa Electric Ry.:
—Board of conciliation formed, 777.
Municipal ownership voted down, 56.
Wage dispute, 979.
Overhead contact system (see also Current collection and Power distribution).
—Catenary insulators, Factors controlling cost of [Austin], *209.
—Construction details, Dallas-Terrell line [Fowler], *591.
—Guy wire protection, *853.
—Line equipment tests, with flexible hanger, in Delroit, *845.
—Network, extensive, in Atlanta, *923.
—Poles, Cast concrete, 486.
—Poles, Perpendicular vs. raked [McKelway], 482.
—Poles, Reclaiming method, *482.
—Poles, Reclaiming method, *482.
—Poles, Wood, Preservation, 525; [George], *1002.
—Practice, Detroit Municipal Ry., 508; Comments on, 503.
—Sectionalizing special work [McKelway], 896.
—Side feeders, Tap intervals, 1094.
—Sleet cutter part of car equipment, 255.
—Spring trolley cars, *129.
—Trolley wire, Copper replaces steel, 572.
—Trolley wire, Copper replaces steel, 572.
—Trolley wire spicer, *734.
—Trolley wire should not be nicked, 126.
—Trolley wire should not be nicked, 126.
—Trolley wire should not be nicked, 126.
—Trolley wire spicer, *734.
—Trolley wire spicer, *734.
—Trolley wire spicer, *734.
—Trolley wire spicer, *734.

P

Paducah, Ky.:

—Paducah Ry.:

City cannot fix fares, 350.

Pacific Electric Ry. (see Los Angeles, Cal.)

Pacific Gas & Electric Co. (see Sacramento, Cal.)

Pacific Railway Club:

—February meeting, 415.

Painting:

—Galyanizing vs. painting for steel structures.

-Galvanizing vs. painting for steel structures, 765.

765.

-Paint shop in Detroit, *923.

-Spraver. Portable compressor for, *124.

-Spray system for cars [Wolf], 732; Comments on, 315.

-Systems and schedules, 323; Comments on.

ments on, 315.

Systems and schedules, J23; Comments on, 831.

Varnishing saves paint, *1001.

Pavements:

—Asphaltic concrete base permits fast work [Elliott], *843.

Assessment in Durham upheld by U. S. Supreme Court, 342.

Charges against San Diego railway put to vote, 257.

Charges annulled in Santa Cruz, 576.

Discussed at Illinois Meeting, 515.

Franchise includes paving clause in Pisinfield, Ill., 534.

Granite block, Asphalt covering method, *481.

Heaving, Track construction change stops, in Allentown, Pa., *677.

Comments on, 670.

Vaintenance equipment, Oil spraying apparatus [Elliott], *94.

—Obligations removed in Beloit, Wis., 1619.

Pittsburgh Rys., Agreement sought with city, 696.

Problems, No common solution [George].

Philadelphia, Pa.:

—American Electric Power Co. (see also American Rys.);

Annual report, 658.

Anduai report, 658.

American Rys. (868 slso American Electric Power Co.):
Accumulated dividends funding plan approved, 262.

Name changed to American Electric Power Co., 262.

Refinancing plan, 142.

-One-man cars favored by chamber of com-merce, 186.

-One-man cars 1avored by chamber of commence. 186.

-Philadelphia Rapid Transit Co.:
Annual report, 347.
Accidents reduced, 702.
Bus and trollibus franchise obtained, 943.
Cars ordered, Details of, *433, *1073.
Car route maps sold, 467.
Employees' funds, 560.
Employees' suggestion card, *513.
Equipment trust certificates sold, 188.
Five-cent fare impossible, 309.
Organization personel changes, 578.
"Service talk," 141.
Signal system, Complete details [Dodd], *711, *761; Comments on, 750.
Trackless trolley franchise sought, 492.
Valuation nearing completion, 306, 701, 821, 863, 1101.
Wage increase announced, 979.

-Rapid transit plans, 220, *382, 490, 615, 696, 858, 1017.

-Trainshed burned, *1057.
Pittsburgh, Pa.:

—Trainshed burned, *1057.

Pittsburgh, Pa.:

—Pittsburgh Railwaya:
Annual report, 495.
Cars sold, 184.
Damage claim plan approved, 260.
Expenditure authorization sought, 629.
Light train, Control details, 919; Comments on, 912.

Pavement agreement with city sought, 696.
Rail weld, Ten years old, *687.
Receivers' accounting ordered, 346.
Receivership to be lifted, 621, 1018.
Service hampered by automobile parking regulations, 258.
Trailer motorized, *919.
Wage demand modification asked, 656, 778, 818, 895.

—Rapid transit plan includes subway, 300.

—West Penn Rys.:

-Rapid transit plan includes subway, 300.

-West Penn Rys.:
Gear ease, Brace for, *1052.
Helical gears successful, 975.
Maintenance cost reduced by metering car
energy, 1093.
Motor bearing bousing, Gage for, *1011.
Motors rewound, Flat wire, 1016.
Safety campaign, 783.
Shop interior painted white, 1013.
Springs trimmed with torch, 1053.
Steel section bending equipment, 973.

Steel section bending equipment, 976.

Pittsfield, Mass.;

Bershire Street Ry.:

Power plant remodeled for fuel oil use,

*050.

Service improvements to follow jitney restriction, 985.

Wages discussed, 1056.

Poles (see Overhead contact systems).

Poles (see Overhead contact systems).

Portsmouth, Va.:

—Portsmouth Transit Co. (see Virginia Railway & Power Co.):

Portland, Me.:

—Cumberland County Power & Light Co.:

Annual report, 740.

Farc cut not necessary, 104.

Wage increase sought, 859.

wage increase sought, 859.

Portland, Ore.:

—Portland Railway, Light & Power Co.:

Block signal for special situation [Charters], *652.

Mayor supports railway against jitneys, 905.

Signal contact sparking eliminated, *935.

Signal system and maintenance [Charters], *408.

Way construction experience [England *200]

Way construction experience [Fuller], *639. Posters (see Publicity, Car cards and posters). Potomac Public Service Co. (see Frederick, Md.).

Power distribution (see also Overhead contact system, and Substations).

—Advances during 1922 outlined, 17.

—Automatic substations solve Cleveland problem [Balel, *359, *405, *477.

—Construction notes, Dallas-Terrell line [Fowler], *591.

*209.

Ohio plans large system, 344.

Parallel line protection relay, *091.

Relay, automatic delay overload, *930.

Short circuit detector [Bale], *405.

Signal system, Power for [Dodd], *711.

Stranded conductor specifications [White], c90.

System layout and maintenance [Rosevear], *453.

-Transformers changed from 25 to 60 cycles, 328.

—Transformer oil maintenance, *471; Comments on, 436. —Transformer with nitrogen filled case, 122. Power generation:

Apparatus improvements during 1922 out-lined, *17.

Power generation (Continued):

—Costs reduced 35 per cent [Druen], *439;
Comments on, 437.

—Great Britain, Systems improved, 303.

—Massachusetts superpower bill passed, 727.

—Ohio plans large system, 344.

—Single phase replaced by D. C., 858.

Power stations and equipment (see also Switchboards and equipment).

—Apparatus improvements during 1922 outlined, *15.

—Ash conveyor, Dustless, 654.

—Barometer and vacuum recorder, *340.

—Boiler details, Pulverized fuel, *725; Comments on, 709.

—Boiler house extension in Boston, *116.

—Boilers installed in New York, 1087.

—Connecticut Co. increases plant equipment, 231.

—231.

—Detroit to build 120,000 kw, slation, 796,

-Detroit to build 120,000 kw. slation, 796.

-- Detroit to build 120,000 kw, slation, 796,
-- Efficiency bettered without expense [Druen],
-- 439; Comments on, 437.
-- Heater, Keeps generator dry, 1034.
-- Oil burners installed, Remodeling details.
-- 505.

*505.

Parallel line protection relay, *691.

Relay, sectionalizes short circuited line, *930.

Relays, Low-energy, 936.

Soot blower, Resists high temperature, *379.

-Soot blower, Resists high temperature, *379.

Providence, R. I.:

-United Electric Rys.;

Axles tested for flaws, *775.

Babbitting bearings, Practice and apparatus, *321.

Bearing caps, Machine for boring, *734.

Buses for short haul passengers, 301, 38S;

Comments on, 632.

Company section meeting with N.E.S.R.C., 933.

933.
Compressor cylinders, Boring machine, *775.
Controller segments made, *530.
Fare register takes several coins, *1048.
Five-cent fare bill before legislature, 308.
Motor casing holes, Machine for boring, *688.
Power plant Pulmains, *4.

*688.

Power plant, Pulverized fuel, Details of, *725; Comments on, 709.

Punch press shears off stock, *689.

Wheel removal equipment [Squier], *477;
Comments on, 437.

Publicity (see also Public, Relations with);

—Advertising hints [St. Clair], 826.

Billhoard advertising, High grade "copy," *203.

Car cords or \$\frac{2}{3}\$ = \$\

*203.

Car cards and posters:
Car window poster. *412.
"Move up front," *605.
Personal touch in, *606.

Discussed by P.U.A.A., 1014.
Effective in bettering public relations, 160.
Honesty and candidness should be keynote
[Barneal, 570.

-Indispensable [Sawyer], 518.
-Methods of handling [Sanders], 794.
-Newspaper retains railway consultant as con-tributor, 536.

-Ohio committee active, 59.
-Open policy best [Lewis], 273.
-Paving tax information poster, 423.
-Pennsylvania utilities form bureau, 615.
-Radiophone broadcasts utility information, 793.

793.

Railway mileage-population ratio as talking point, Comments on, 911.

Route maps sold, 467.

Weekly pamphict, "Pass One," *622.

Safety campaign, Effective in [Price]. *805, *847, *883, *938, *964, *999, *1041; *1083; Comments on, 789.

Story useful [Burroughs], 1089.

Public, Relations with (see also Publicity); Accessible management betters [Elwell], 275.

Advertising betters [Sawyer], 518; [St. Clair], 526.

Bettered by extensive campaign, 160.

Bettered by extensive campaign, 180.

Buses presented to city, 541.

Car appearance factor, Comments on, 437.

Car cards, Personal touch, *806.

Carmen's identification, Names replace numbers, 62.

oers, 62.

Car painting as a factor, Comments on, 911.

Commission as connecting link [Lewis], 273;

[Keller], 276.

Constant action needed to better [Barton], 967.

967.

"Courtesy week." 782.

Customer ownership, Comments on, 1031.

Discussed by N.E.L.A., 968.

Discussed by V.J.A.A., 1014.

Discussed by S.P.S.A., 891.

Employees' bonus for courtesy, 943.

Honesty and candidness prevent misunderstandings [Barnes], 570.

Illinois committee active, Results, 515.

Lessons of experience, Comments on, 871.

London underground officials study American conditions, 820.

Old cars for emergency homes, *888.

Personal touch needed, Comments on, 395.

Public meetings with good results [McCarter], 286.

Railroads, "Positive publicity" needed [Budd].

Railway development dependent on [Saw-yer], 9.

Service before profits policy betters, Com-ments on, 385. Service impaired by political antagonism, 183. Stock issue to be sold to patrons, 621. Washington committee on public information formed, 221.

Public. Relations with (see also Publicity) (Continued):

-Weekly pass improves [Boyce], 206; [Greenland], 206.

Public service and regulative commissions:

-Connecticut commission work outlined [Elwell, 275.

-Development and objective, Comments on, 271.

-Engineers' conference, Grading public utilities discussed, 414.

-Functions stated by Illinois Supreme Court, Comments on, 1072.

-Indiana Public Utilities Assn. discussion, 212.

-Motor bus regulation by [Fenner], 208; Discussed by N. V. E. R. A., 207.

-New York State bill would strip commission of power, 57, 136, 184, 258, 299, 342, 381, 491, 535, 615, 617, 655, 738, 818, 978; Comments on, 2, 272, 790.

-Objectives [Lewis], 273.

-Ohio commission attacked by governor, 695.

-Ohio commission to regulate buses, 782.

-One-man cac, Authority over in Virginia, 422.

-Reasonablo regulation desirable [McCarter], 284.

-South Carolina commission operates railway 284.
—South Carolina commission operates railway -South Carolina commission operates railway system, 183
-Tenoessee abolishment bill fails, 1055.
-Tenoessee courts' power to review finding questioned, 300.
-Virginia needs [Wheelwright], 286.
-Washington, D. C., commission accomplishments [Keller], 276.
-Public Service Corp. (see Newark N. J.).
-Public Service Ry.: (see Newark N. J.).
-Public Utilities Advertising Assn.:
-Annual convention:
- Proceedings, 1014.
- Program, 891.
- Program, 891.
- Puget Sound International Railway & Power Co.
- (see Everett, Wash.).
- Puget Sound Power & Light Co. (see Seattle, Wash.).
- Purchasses:

Q

Purchases:
—Detroit Municipal Ry, practice, 647.

Quebec, Que., Can.;
—Quebec Railway, Light, Heat & Power Co.;
Annual meeting, 659.
Control changes hands, 901.

Radio telephone for railways:

—Broadcasted program received on moving ear, 240. —Tried on Third Avenue Ry., 554. Rail cars (see Motor cars, Gasoline) Rail joints and bonds:

--Boosting plan, *1000,

--Chromenickel steel joints last [Hibbard],

*40. -Comprimise joint, Easy method, *816, -Cross bonds, Iron pipe terminals [Wilder], *688. Ratia:

—Barbey rail reduces noise, *1038.

—Base corrosion causes removal, *613.

—Corrugation studied in Detroit, *1040.

—Fastened with eccentric grip washer, *131.

—Report of A. R. E. A., 609

—Situ rail-hardening process tested, 940.

Rail transportation 100 years old, Comments on, 709. Ralla:

on, 709.

Railways:

Better days coming [Emmons], 283.

Conditions in 1921 and 1922 compared, 578.

Developments during 1922 [MacMurray], *31.

Engineering during 1922 progresses, *11;

Comments on 2.

Pinancial condition, 1922 shows improvement, 10. Comments on, 1.

Future bright [Coolider], 282.

Not without triends, Comments on, 271.

Opportunities and responsibilities, Comments on, 435.

Present day problems [Greenland], 166.

Princeton lectures on, 381.

Ratings based on service suggested, 409;

Comments on, 300.

United States Chamber of Commerce discusses transportation, 809; Comments on, 700.

Reading, Pa.

transportation, 809; Comments on, 700
Reading, Pa.*

Reading Transit & Light Co.;
Park rehabilitated, 960.
Pavenent repairs ordered by commission, 655
Receiverships (see Financisi).
Receiverships (see Financisi).
Receiverships (see Substations and Equipment).
Repair shop practice (see also Painting and Repair shops and Equipment):

—Armature barding, Tin replaces solder, 573
—Armature tearings Branze limings for *1011.

—Armature coils cleaned by boiling, 377.

Repair shop practice (see also Painting and Repair Shops and Equipment) (Continued); —Armature coils, Dipping and baking [Dean], *652.

*652.

Armature coils, Soldering to commutator [Signor], *815.

Armature core laminations closed up, 574,

Armature core laminations closed up, 574,

Armature core reclaimed, *180.

Axie removal method, 974.

Bearings, Bablitting practice, *321.

Bearings, Rehabblitted, Edges smoothed, 574.

Bolts, Heat treated [Signor], *484.

Car hour record fixes inspection time, *531.

732.

Casting particular systemetized [Dalgleish], *235.

-Car overhauling systemetized [Dalgleish], *235.
732.

-Casting parts from electric furnace economical, *071; Comments on, 669.
-Centralization betters repairs and decreases costs [Dean], *317.
-Compressor parts, Cleaning method, 573.
-Compressor shafts welded, *124.
-Compressor shafts welded, *124.
-Compressor shafts repaired, 180.
-Expenso reduction notes [Porter], 931; Comments on, 691.
-Few reserve cars, Problem solved in Binghermon, N. Y., 1603.
-Keeping shop neat, 124.
-Metals cut with electric are [Candy], 332.
-Motor cases, Reboring, *335.
-Motor maintenance [Dean], *111.
-Motors rewound with flat strip, 1016.
-Oil consumption minimized, 573.
-Oid axles, Uses for, 420.
-Orderliness desirable, Comments on, 831.
-Painted lines aid in keeping order, *975.
-Piece-work system incentive, *443; Comments on, 436.
-Pipe cutting in limited space, 574.
-Resistor grid, Contact spanner, *1613.
-Routing of work in Toronto, *723.
-Springs trimmed with torch, 1053.
-Suggestions from employees, Comments on, 110.
-Switches Control, Rebuilt, 482.

110.

Switches Control, Rebuilt, 482.

Systemetized in new shops with modern equipment, *239.

Test procedure [Dean], *317.

Truck overhauling methods, Survey of 50 shops, *833; Comments on, 831.

Truck pedestal reinforcement, *420.

Waste cleaned, 634.

Wheel and axle shop practice [Hochette], *215.

Wheel removals [Squier], *447; Comments

*215.

-Wheel removals [Squier], *447; Comments on, 437, 831.

-Wheels, Worn flanges, Salvaging [Merten], *679.

Repair shops and equipment (see also Painting and Repair Shop Practice), -Armature, Baking ovens [Dean], *684.

-Armature banding machine made from lathe, *654.

*654.

-Armature dipping equipment, *689; [Dean] *776. *895.

-Armature rack, Large capacity, *814.

-Armature shaft, Machine for straightening, *378.

*378.

*378.

Armature transfer ear [Dean], *035.

Antiquated machinery, Replacement of, Comments on, 169.

Apparatus hints [Dean], *317.

Axles and flanges, Device for use in building up, *974.

Axles and flanges, Perice for use in building up, *974.

Axle testing press, *775.

Babbitting ligs, *419.

Bearings, Apparatus for babbitting, 321.

Bearings caps, Machine for boring *734.

Bolt threading machine useful *531.

Bulletin board, Revolving *687.

Bushing and pin data table, 1652.

Can body hoists, Survey of 50 shops, *833;

Comments on, 831.

Chuck for fluishing motor bearings, *129.

-Chuck for irregular shanes 1613.

-Chucks, Self centering, *370.

-Chucks, Self centering, *370.

-Circuit breaker test punel, Low voltage, *894.

-Commutator lead soldering machine, *96.

-Commutator slotter, *614, *1652.

-Commutator control, Automatic, Home-made, *612.

*612.
-compressor cylinder reboring equipment, *334, *775, *1010.
-compressors, Improved models, *532.
-concentration of work, Comments on, 831.
-connecting rods, Finishing equipment, *1654.
-controller segments, Machine for making, *530.

Controller segments, Machine for making, *5710.

Controller with resistance to move trucks under own power [Dalgleish], *235.

Conveniences make for economy, 410.

Cylinder grinding and bearing boring equipment, *973.

Electric battery lantern, *340.

Electric furnace for casting steel, *671; Comments on 600.

Expediting work, Comments on, 992.

Expediting work, Comments on, 992.

Forge blast supplied by old compressor motor, 377.

Gardens interest employees, 985.

Gaskets, Machine for cutting, 256.

Hammer drill, Gasoline deiven, *975.

Heat treating furnase, *801.

Housekeeping pointers, *125.

Hydraulic press, Shop constructed [Elliott], *484.

*and treating motor drive efficient [Rice], *475.

— individual motor drive efficient [Rice], *475 —Jack Portable pneumatic, *934 —Jack testing device, *774, —Keywaya Tool for cutting, *914,

Repair shops and equipment (see also Painting and Repair Shop Practice) (Continued):

—Lamp cord for rough usage, 134.

—Modern equipment economical, Comments on.

[Vol. 61

-Modern plant, Complete details, *238.

-Modern plant, Complete details, *238.

-Motor bearing bousing, Gage for, *1011,

-Motor cases, Jig for reboring, *335.

-Motor casing holes, Machine for boring, *688.

-Motor, Stamped rotor winding, *134.

-Multiple-unit control test apparatus, 894.

-Oil, Centrifugal separator, *471; Comments on, 436,

-Oil handling equipment, *846,

-Oid shops, Improvement pays, Comments on, 831.

-Pedestal jaw bolts, Apparatus for removal.

-Pedestal jaw bolts, Apparatus for removal, *613,

- Pedestal law bolts, Apparatus for removal.

*613.

Pedestal law bolts, Apparatus for removal.

*613.

Pice-work shop, Equipment arrangement,

*443: Comments on, 436.

Pinion puller, *936, *1653.

Pit lamp, Protected against water, *686.

Pump, Self priming, *574.

Punch press to shear off slock, *689.

Reamers, Expansion, 1054.

Sand drier and screener, *776.

Sander, Home-made, *774.

Steel figure dies, "All in One," 691.

Steel section bending equipment, 973.

Tape, Seamless, 1013.

Tools panted white, 1013.

Tools panted white, 1013.

Transfer tables, Covered, *934.

Transfer tables, Covered, *934.

Transmission device, Variable sneed, *132.

Truck lifting equipment, *1009.

Truck overhauling equipment, Surves of 50 shons, *833; Comments on, 831.

Trucks moved under own power, Equipment for, *336.

Truck stands, Reduce overbauling time, *853.

Trucks tansferred from pit to pit, Apparatus for, *337.

Waste saturating machine pays, *676.

Wedder Are automatically breaks, *600.

tus for, *337.

- Waste saturating machine pays, *676.

- We'der. Are automatically breaks, 692.

- We'ding room arrangement, 1012.

- Whee' and axle shop efficiently arranged [Hochettel], *215.

- Wheel lifting equipment, *1612.

- Wheel removal, Equipment for [Squier], *447; Comments on, 437.

Richey conspectus of indexes, 187, 348, 539, 740, 903, 1062.

Richmond Light & Railcoad Co. (see New York City).

City).

Richmond, Va.:

—Virginia Railway & Power Co.:

Annual report, 699.

Fare controversy, 389, 1024.

Improvements planned, 1019.

Organization and service, Report, 243, *307;

Comments on, 233.

Railway properties segregated, 861.

Valuation report, 161, 902.

Rochester, N. Y.:

—Eric Canal electrification contract awarded.

tochester, N. Y.;

-Eric Canal electrification conversed.

Eric Canal electrification conversed.

S18.

-New York State Rys.;

Amusement park that pays. *157.

Annual report, 427.

Bus and trackless trolley franchise sought,

351, 388, 825.

Buses ocdered, 742.

Oil room kept clean, *338.

Rental suit dismissed, 1018.

Track work, Machinery used extensively,

*117.

Truck overhauling methods, *833; Commients on, 831.

Wage increase demanded, 423, 938, 978.

-Newspaper retains railway consultant as contributor, 536.

Rochester & Syracuse R.R. (see Syracuse, N. Y.)

Rockford, 111.

-Rockford & Interurban Ry.;

Double track, No paving charges, 1019.

Ticket book with reduction in rates, 622.

Rock Island, 111.;

Rock Island, 111.;

**Ine sought, 660.

**RO.*

Rock Island, Ill.:

—Tri-City Rallway of Ill.:

Abandonment of line sought, 660, Identification card sales high, 189, One-man car, Safety devices for, *369.

S

I. Johns, N. B.;

-New Brunswick Power Co.;

City controversy, 5d.

Injunction against competitor sought, 822,

Purchase terms may be arburated, 143,

Weekly pass successful, 622, Louis, Mo.: Amalgamated Assn. to erect building, 1958. Railroad electrification within city sought. Railroad electrification within city sought, 978.

Prs. —United Railways Company of St. Louis. Annual report, 1061.
Carhouse and storage yard, Details of, 4143.
Chucks, Self centering, *370.
Commission valuation figures, 980.
Franchise change needed to permit improvements, 899; Commeots on, 872.
Power, Economy meters save, 905.
Separation of suburban system suggested, 941.
Seven cent fare extended, 62.
Stop light bill killed 576.
Valuation, 346, 1192.

St. Louis, Mo. (Continued):

Waste saturation cuts oil consumption,

*676; Correction, 878.

Wheel removal equipment [Squier], *447;
Comments on, 437.

St. Psul City Ry. (see Minneapolis, Minn.)

St. Petersburg, Fls.:

St. Petersburg Municipal Ry.:

Cross bonds, Iron pipe terminals [Wilder],

*088.

Gage for angle bar space, *254.

Track sage [Wilder], *653. Track gage [Wilder], *653.

Sacramente, Cal.:

—Pacific Gas & Electric Co.:
Cars reconstructed for one-man eperation,
*530.

Passenger statistics, 1063.

Safety Cars (see Cars, Safety).

Safety work (see also Accidents).

—Accident map used with trainmen,
Machielent map used with trainmen, 105.

—Accident prevention awards in Nashville,
Tenn., 141.

—Accidents, Automobile, Problem discussed [Howsrd], 570.

—Accident prevention, Discussed by W. U. A.,
567. -Accident prevention, Discussed by W. U. A. 567.

-Automobilists, Federal test suggested, 1078.

-Automobilists, Suggestions for, 364.

-Carrying safety to the public [Price]. *805.
 *847. *883. *928. *964. *999. *1041.
 *1083; Comments on, 789.

-Car stop plan needed in Detroit, 1064.

-Ditch keeps vehicles out of tunnel, *1042.

-Emergency stops, Methods [De Campl, 172.

-Employees' efficiency campaign, 97.

-Nashville campaign progressing, 702.

-New York City campaign, 943.

-Organization for [Funkl, 213.

-Philadelphia work effective, 702.

-Platferm light for one-man car, *128.

-Safety contest, 383.

-School children lectured, 703.

-Stop Ismp signal, 574.

-Stop sign shows when car deer opens, *613.

-Tra rules suggested, 743.

-Traffic relief, 905.

-Walkway surfaces. Safety cods, 297. 522;

Comments on, 950.

-West Penn Ry, accidents few, 783.

-Window wiper for one man car, *339, *688.

Saginaw, Micb.;

-Sazinaw-Bay City Ry.; Annual report, 1717.

Tariff discrimination protested, 695.

—Utsh Light & Traction Co.:
One-man cars approved, 1064.
Safety window exhibit, *1025.
San Antonio, Cal.:
—San Antonio Public Service Co.:
Bushing and pin data table, 1052.
San Diego, Cal.:
—San Diego, Cal.:
—San Diego Electric Ry.:
Beach resert with railway feeder planned, *737.
Employees efficiency campaign, 87.
Pamplet, "Pass One," *622.
Pavement charge goes to vote, 257.
Paving costs, Relieved from, 655.
Rerouting of cars improves service, 985.
"Tourist pass," 308.
Track reconstruction, *719.
Wages increased, 576.
—Trolley ride puts baby to sleep, 498.
Sanferd, Me.: Sanferd, Me.:
—Atlantic Shore Line Ry.:
Reorganization planned, 600. Reorganization planned, 000.

San Fraucisco, Cal.:

—Bus line planned, 104.

—Market Street Ry.:

Compressor control, Automatic, Home-made, *612.

Electric craus with only one trolley pole. *337.

Old axles useful, 420.

Rail joint plates protected in storage, *572.

Rail joint plates reclaimed, 333.

Roller link chain on conveyer successful, 377.

Spot welded fastenings improve wheelbarrow, *378.

Wage increase announced, 738.

—San Francisco Municipal Ry.: Wage increase announced, 738.

—San Francisco Municipal Ry.:
Annual report, 384.
Armature banding, Tin replaces solder, 573.
Bearings, Rebabbitted, Edges smoothed, 574.
Brake fulcrums, Forged steel, *013.
Car hour record, *531.
Centrol switches rebuilt, 482.
Critical period ahead, 823.
"Fare 5 cents" painted on cars, 1103.
Keyways, Tool for cutting, *614.
Progress in ten years, 59.
Wage increase sought, 490.
San Francisco-Oakland Terminal Rys. (see Oakland, Cal.)
San Jesé, Cal.:
—Peninsular Ry.:
Abandenment authorized, 103.

Santa Barbara, Cal.:
—Santa Barbara & Suburban Ry.:
Weekly pass trial successful, 190.
Santa Cruz, Cal.:
—Union Traction Co.:
Paving charges annulled, 570. Paving charges ammined, 576.

Schedules and time tables:

Board visualizes. Easily changed, *553.

Car departures, Announcement board, *132.

Headway recorder, Direct reading, *733.

Headway, Suggestions for heavy traffic routes, 243. 243.

—London cars speeded up, 049.
—New Orleans schedule recommendations, *961.
—Rearranged as result of study, *951.
—Schedule clock dials over sidewalk, *650.
Schenectady, N. Y.:
—Schenectady Ry.:
Arbitration refused, strike declared, 860, 900, 938, 979, 1018 1057.
Bus operation announced, 661.
Commission service order, 661.
Scranton, Pa. Bus operation announced, 661.
Commission service order, 661.
Scranton, Pa.:

—Lackawanna & Wyoming Valley R.R.:
Revarnishing cars saves paint, *1001.
—Scranton Ry.:

Barbey rail reduces noise, *1038.
Traffic tower, Remote control, *803.
Valuation upheld, 782.
Wage question to be arbitrated, 610, 1019.
Seattle, Wash.:

—Puget Sound Power & Light Co.:
Five cent fare failure, 582, 1025.
Purchase fund suit dropped, 701.
Securities sales company organized, 224.
Specifice performance suit, 381.
Tax decision appealed, 61, 421.
Wage increase sought, 1019.
—Seattle Municipal Ry.:

—Seattle Municipal Ry.:

Annual report, 861; Comments on, 832.
Bond sale negotiations, 1102.
Cars to be leased, 183, 502, 545.
Extension proposed, 542.
Five cent fare experiment, 227, 430, 541, 623, 742, 782, 804, 906, 943, 980, 1019, 1058, 1103.

Pass requested, One year's advance payment, 351.
Payment delay, Bondholders agree to, 817.
Purchase contract rewriting suggested, 697.
Six-day week for carmen before legislature, 309.
Support from general fund illegal, 622.
Track reclaimed in paved street [Pierce], *329.

—Lsbor costs [Dsna], c480.
—Seattle & Rainier Valley Ry.: —Labor costs [Dana], c480.

—Seattle & Rainier Valley Ry.:
Fare protest, 498, 702.
Weekly pass trial, 623, 661.
Second Avenue Ry. (see New York City). Second Avenue Ry. (see New York City).

Sedalia, Mo.:

—City Light & Traction Company of Sedalia:

Power plant constructed, 577.

Service and tower trucks.

—Air compressor mounted on Ford chassis,

*330.

—Electric welder and grinder on Ford chassis,

*1005.

Snaw broom for truck *600. —Snew proom for truck, *600.

—Type determined by local conditions [Rosevear], *453.

Service-at-cost (see Franchises). Sheboygan, Wis.:

—Eastern Wisconsin Electric Co.:

Track maintenance notes [Oldfield], 567. Shore Line Electric Ry. (see Norwich, Conn.) Shreveport, Ls.:
—Shreveport Rys.:
Fare increase suggested, 742. Signals:
—Block signal for special situation [Charters],
*051. Car whistle, Automatic blast regulator, *90.
Contact sparking, Condenser eliminates, *935.
Crossing signal, *84.
Cressing signal with motorman's pilot light, 1047. Crossing sign, Thirty-day oil lamp, *338.

—Frankford Elevated system, Complete details [Dodd], *711, *761; Comments on, 750.

—Light and mechanism separate, *1053.

—Maintenance care reduces failures, 254.

—Manual system, Simple [McKelway], 852.

Red lantern for construction protection, 1013.

—Recent developments, 339.

—Repeater signal shows line cleared, *037.

—Stop lamp for rear of car, 574.

—System and maintenance details [Charters], *648.

—Traffic, Interlocking, hinder cars, *1038.

—Traffic signal color standardization, 856.

—Traffic signal, Remote control, *803.

Skip-stop (see Stopping of Cars). Snow removal:

-Broom core construction, *1093.

-Broom for automobile truck, *690.

-Organization for, 331.

-Plow, Demountable, For use on Differential, Car, *217.

Snow, looder, replaces, 100, shovelers, *216. —Snow loader replaces 100 shovelers, *216.
—Sweeper, Chainless, Construction details, *1077. Society for the Pr Education: —Annual convention: Discussion, 1091. the Promotion of Engineering

South Bend, Ind.:

—Chicago, South Bend & Northern Indians Ry.:

Freight journal entry system [Hesth], 522.

South Carolins Gas & Electric Co. (see Spartanburg, S, C.) tanburg, S. C.)

Sonth Charleston, O.:
—Springfield & Washington Ry.:
System being dismantled, 142.
Southern Indiana Gas & Electric Co. (see Evansville, Ind.)

Southern Public Utilities Co. (see Charlette, N. C.) South Jacksonville, Fla.:

—Railway to be constructed, 859.

Southwestern Electric & Gas Assn.:

—Name changed, 55. —Name changed, 55.

—Name changed, 55.

Southwestern Public Service Assn.:

—Annual convention:
Papers and discussion, 931, 1050; Comments on, 1031.
Proceedings, 891.
Program, 694.

Spartanburg, S. C.:
—South Carolins Gas & Electric Co.:
Abandonment suggested, 937, 1096.
Commission management, Reports to be made public, 778.
Fares reduced as experiment, 497.
Service suspended, 60, 104, 183.
Traffic decreases due to bus competition, 383.

Special trackwork: Traffic decreases due to bus competition, 383.

Special trackwork:

—Accounting system [Genest]. *755.

—Castings made in company shops, *671; Comments on, 600.

—Chrome-nickel steel, Reasons for use of [Mortimer], c008.

—Chrome-nickel steel used, Results good [Hibbard], *461.

—Construction, Notes on [Oldfield], 507.

—Guard rail mounting, *934.

—Heavy traffic districts, Suggestions for, 243.

—Nickel-chrome steel for ["Engineer"], c122.

—Signal-switch interlocking [Dodd], *761; Comments on, 750.

—Switch point protector, *132.

—Welds prove econemical, 614.

—Wood tics facilitate repairs, *1049.

Spokane, Wash.:

—Spokane United Rys.;

Armature bearings, Solid end, *126.

Springfield, Mass.: Springfield, Msss.;
—Springfield Street Ry.:
Annual report, 1022.
Bus service provided, 145.
Power saved by use of recorders, 531.
Rerouting and feeder buses recommended. Springfield, Mo.:
—Springfield Traction Co.:
—Platform light for one-man car, *128.
Weekly pass to be tried, 541. Weekly pass to be tried, 541.
Springfield, O.:
—Columbus, Newark & Zanesville Electric Ry.:
Line abandoned, 494.
Reorganization plans include merger, 222,
—Indians, Columbus & Eastern Traction Co.:
Bus service started, 663.
Columbus-Grove City line abandonment appreved, 981.
Columbus-Orient line abandoned, 780, 825, 780. appreved, 981.
Columbus-Orient line abandoned, 780, 825, 780.
Lima-Defiance branch seld, 306, 539.
Line abandoned, 225.
Property may be sold to patrons, 102.
Public relations, Extensive betterment campaign, 100.
Ticket sales under department of public relations, 1065.
Wages increased, 860.
—Springfield, Troy & Piqua Ry.:
Service abandoned, 56, 187.
Springfield & Washington Ry. (see South Charleston, 0.)
Standardization:
—American Engineering Standards Com.:
Engineering symbols, 452.
Funds for, New plan, 364.
Paint specifications, 890.
Rail standards of A. E. R. A. adopted by A. E. S. C., 341; Comments on, 316.
Standards of A. E. R. A. accepted, 609.
Traffic signal colors standardization, 856.
Walkway surfaces, 1091.
—Industrial standardization, Need for [Whitney], 607.
—Purchasing agents' werk fertile field, 892.
—Simplified practice, Comments on, 031.
—Wood testing, 207.
Staten Island Midland Ry. (see New York City) Statistics:
—Accidents, 570, 582, 602, 702, 805, 847, 890;
Comments on, 789.
—Automotive equipment, 1922 railway orders, 43.
—Automotive equipment, 765. -Automotive equipment, 1922 railway orders, 43.

-Automobile market, 765.
-Automobile passenger, 046,
-Boiler efficiency, Pulverized fuel, 562.
-Car equipment, 14 cities, 862.
-Car equipment specifications, 433.
-Car heating costs, 1107.
-Car heating costs, 1107.
-Car maintenance in Detroit, 508; Comments on, 503
-Cars rebuilt during 1022, tabulatiou, 41.
-Car repair costs, Piece-work wage scale, *443; Comments on, 436.
-Detroit discipline cases, 881.
-Distribution costs, D. C. versus A. C., *913.
-Electric locomotives, 1922 orders, 41.
-Elevated construction costs [Cram], c513.
-Employees co-operative fund, 560.

Seuth Africa:
—Electrification planned, 107.

Statistics (Continued):

-Financial:
Bond market, 1100.
Brooklyn Rapid Transit existing securities and claims, 305.
Chicago traction fund, 1023.
Maturities, 537.
Railway finance, 1922 shows improvement, 10; Comments on, 1. Receiverships and foreclosures. Comparative tabulation, 45. Security anction sale, 538. Transportation investments, 528. -Freight traffic in Northern Ohio, 728.
-Living costs, 880, 1048.
-Lubrication chart [Dalgleish], *235.
-Maintenance expense [Dalgleish], *235, 508;
Comments on, 503.
-Motor bus operation, 385, —New York State Commission reports, 99.

—Otherating:
British transways, 940.

Buses and railways compared [Beeler], *87. Conditions in industry [Emmons], 10. New Orleans Public Service Inc., 1079, One-man cars (Graham], 168, Schedule, Route lengths, Stops per mile, Summary, 1921 and 1922 compared, 578. Power requirements, Steam vs. electric loco-motives [Babcock], 770.

 Power saving [Dalgleish], *235.

 Price, wage and fare tabulation covering ten years, *23. -Rail joints, Welded, Test data, *555 Community Traction Co., 187, 538, 739. Cumberland County Power & Light Co., 739. Benver Tramway 494
Detroit Mumcipal Ry., 540, 739, 863. Detroit United Ry., 304. Duluth Street Ry., 552. Duluth Street Ry., 552. Eastern Massachusetts Street Ry., 780. Georgie, Rullwan, Benver Ry., 780. Eastern Massachusetts Street Ry., 780. Georgia Railway & Power Co., 1021. Grand Rapids Ry., 578. Indianapolis Street Ry., 700. Interborough Rapid Transit Co., 225, 426. International Ry., 580. Internate Public Service Co., 659. Kansas City Rys., 501. Louisville Ry., 386. Milwaukee Electric Railway & Light Co., 405. Montreal Tramways & Power Co., 1100, New Jersey Public Service Corp., 658, New Orleans Public Service, Inc., 139, 263, 781. New Orieans Fudne Service, the, 199, 200, 781.

New York City, 493.
New York State Imes, 188.
New York State Rys., 427.
North American Co., 424.
Philadelphia Rapid Transit, 347.
Salt Lake & Utah R.R., 741.
Salt Lake & Utah R.R., 741.
San Francisco Municipal Ry., 384
Seattle Municipal Ry., 259, 541, 861.
Springfield Street Ry., 1022.
Sydney Tramways, *71.
Terre Haule, Indianapolis & Eastern Traction Co., 622.
Toronto Transportation Commission, 821;
Comments on, 740, 846.
Twin City Rapid Transit Co., 224.
Inited Railways of St Louis, 1061.
Itah-Idaho Ceutral R.R., 741
Virginia Railway & Power Co., 699.

—Holling stock (Dalgleish), *235.

—Rolling stock orders, 1922 shows large increase, *35; Comments on, 1 Signal operation, 254 [Charters], *468. Staple commodities World stock, 869 -Track, Chrome-nickel steel tests [Hibbard], -461. Track construction and repair 51

Track relaying costs [Pierce], *329,

Track work Units per man-hour, 1007

Traffic, 145, 222, 348, 403, 404, 580, *716, 722, 1035, 1039, 1003; Comments on, 710. -Weekly pass, 428, --Weekly pass, 428.

--Valuation (see also Appraisal of railway property)
Alabama Power Co., 1021.
Boston Elevated Ry., 201.
Denver Tramways, 953.
Duluth Street Ry., 552
St. Lonis, Mo., 980
Virginia Railway & Power Co., 161, 102
Weekleton Bellows & Placetic Co., 2011. -Washington Railway & Electric Co equipment [Dean] *317
Steubeoville, East LAverpool & Beaver Valley
Traction Co see East Liverpool, O) Stopping of cars

Detroit needs plan 1001

Heavy traffic routes Suggestions for, 243
Interlocking traffic signals affect *1038

Loading platform Routes segregated, *878

Parts and Berlin [Turner], 153

Hecommendations for New Orleans, *981.

Stores:

—Accounting, Use of machines for [Peery], 413.

—Centralized store system in Detroit, *1085.

—Oil room kept clean, *338.

—Stores and inventory methods [Farwell], 519. Storm and fire damage:

Hot Springs flood reports exaggerated, 8:

Indiana wind atorm cripples service, 533.

Lousville, Ky., carbouse burned, 140.

Philadelphia trainshed, *1057. Strikes and arbitrations:

—Albany situation, 979,

—Buffalo strike situation, 260, 302, 344, 539, 939. -Eastern Massachusetts Street Ry, to arbitrate 1020, 1055, 1009.

Substations and equipment:

—Automatic type:
Design details, Building and apparatus
[Bale], "350, *405, *477.

Make D. C. operation more economical than
A. C., *913.

Progress during 1022 outlined, 18.
Bemote control, Non-overloadable semiautomatic, Complete details, 873; Comments on, 871.

—Automatic versus manual [Davis], 171;
[Butcher], 173, —Progress and prospects [Bale], c122.

—Transformers changed from 25 to 60 cycles,
Subways; - Transformers enabled from the Considering of Chicago, Detroit and Philadelphia considering.

Comments on, 911, 949.

Chicago needs, 480.

Construction costs increasing, 1037.

- Detroit dips planned, 422, *480; Comments on, 949. —Glasgow system to be owned by municipal-ity, 186, 1000, —Liverpool, Glasgow and Edinburgh, Reports on [Turner], 1639 on [Turner], 1996 London, England, program, 58. -New York, London, Puris and Berlin systems compared [Turner], *79. Switchboards and equipment:

-Automatic substation control circuits, *873;

-Automatic substation equipment, Details of [Bale], *350. Switzerland: -Electrification speeded up, 605. Sylvania, O.:

Toledo & Western R.R.:

Foreclosure ordered, 904, 1100,
Track construction prevents
[Swartz], c709, *c889. heaving Syracuse, N. Y.:

-Rochester & Syracuse R.R.:
Annual report, 494.
Empire State Railroad Corp. taken over
by, 60.
Route shortened, Eric canal filed, *197. Т

Tacoma, Wash.:

—Tacoma Municipal Street Ry.:

Receivership averted, 861. -Chamber of Commerce considers 493 -Franchise tax discussed [Davenport], 277, -Franchise tax payment deferred, 103, 143, -Gross receipts tax upheld, 581, -Paid by whom? [Maithe], 287 -Faid by whom? [Maithie], 287

-Payment deferred in Chichinati, 1103.

-Public Service Corp. wins suit, 263.

-Raifways burdened with [Emmons], 283; [Ives], 287; Comments on, 272.

-Relief provided in five-cent fare bill, 582.

-Relief sought from excise tax, 59.

-Seattle, Wash., decision appealed, 61, 421.

-Systems of taxation [Davenport], 277; [Davison], 280. -Utility taxation methods, 603, Comments on, 589, -Virginia utility taxatlan [Forward], 279 Tax exempt securities (see Financial). Tecnomasia Italiana Brown Boverl: —High voltage locomotives in Europe, e111, Teonessee, State of: —Commission abolishment fails 1055

Terminals and waiting stations

—Chicago plans terminal for seven railroads, 218, Comments on, 234

—Freight and passenger accommodations, *197, —internittent high density traffic handled, *633,

Terre Raute, Iod :
-Jitoey ordinance proposed, 1025.

Terre Haute, Ind. (Continued);

—Terre Haute Traction & Light Co.:

Weekly pass successful, 351; [Walker],
200. Terre Haute, Indianapolia & Eastern Traction Co. (see ludianapolis, Ind.).

Co. (see Iodianapolis, Ind.).
Tests of material and equipment:
—Air brake operation test [Sanders]. *402.
—Axles, flaw detection. *775.
—Brake rods [Dean]. *319.
—Car air reservoirs, Hydrostatic test [Bolt].
*851.

-Chrome-nickel steel track tested [Hibbard], •461, -Circuit breaker test apparatus, Low voltage, •864,

-Electrical equipment [Dean], *318. -Fuel consumption in locomotives [Babcock], 770.

T70.

Fuel. Pulverized. Efficiency tests, 562.

Hardness testing apparatus, *896.

Multiple-unit control test apparatus, 894.

Overhead contact equipment, *845.

Rail joint service tests, Comments on, 357.

Roller bearing friction tests, *682.

Wedded rail joints, extensive tests, *555.

Wheels and axles [Dean], *318.

Wwood testing to be standardized, 297.

Texas Interurban Ry. (see Dallas, Tex.).

Texas, State of:

Electrification considered by several railroads, 662.

Railway has operation.

-Railway bus operation bill vetoed, 017. Third Avenue Ry. (see New York City). Tickets and tokens (see Fare collection).

Concrete satisfactory [Wadsworth], c730,—Interurban line tie specifications [Fowler], *591.

- Made from old rails, *852.

- Preservative oils for [Hartman], 298.

- Preservative treatment pays [George], *1002.

- Renewal program (Oldheld), 567.

- Steel ties used in San Diego, *719.

- Steel, Wear well, *850.

- Wood ties for special track work, *1040

Timber:

Conservation necessary, Commenta on, 912. Tokens (see Fare collection).

Tokens (see Fare collection).

Toledo, O.:

—Community Traction Co.:

Annual report, 537.

Bus plans, 189, 388.
December report, 187.

March report, 739.

Valuation raised, 1022.

Wage scale revision planned, 617, 897.

—Transit extensions planned, 575.

Toledo & Western R.R. (see Sylvania, O.).

Toronto Ont. Can.:

Toledo & Western R.R. (see Sylvania, 0.).

Toronto, Ont., Can.;

—Toronto Ry.;

Car storage facilities modern, *791.
Old cars for emergency homes, *888.

Traflic atudy system, *951.

Trailer, Three doors, Quick loading, *1033.
Valuation, 235, 247, 427, 778; Comments on, 234.

Expenditures in reconstruction, 220.

Report on first 16 months, 821; Comments on, 790, 840.

Shops, 1,200 ear capacity, Details of, *723.

Track abandoned (see Abandoning of lines).

-Electric welder and grinder on Ford chassle. -Elevated railway cost data [Cram], e513. -European practice compared with American [Bland], c*80.

—Gage for switches and curves [Wilder], *653.
—Joints, Location to reduce swaying [Potter], 292.

-Machinery reduces coat, *458; Comments on.

-Machinery used extensively, *117.
-Pavement heaving due to, *677; Comments on 670.

-Pavement heaving prevention [Smith], cssp; [Swartz], e709, c*889.

OWARLE, COUR. C-889.

-- Progress during 1022 apparent, 11; Comments on. 1.

-- Hail bender, Home made, *687.

-- Hail direct oo concrete slab [Fuller] *030.

-- Hail fastening, Eccentric grip washer for, *131.

"131.

Rail filler, Elastic, "488.

Soit ground, Beavy traffic, Details of "7.

Statistics of, Comparative tabulation Comments on, 4.

Streams to curves, 524.

Trolley rail height gare, 420.

Trackless Trolleys:

Franchises (see Franchises).

Milwaukee system seeks permit, 190.

Track maintenance:

Track maintenance:
—Accounting system [Genest], *755.
—Costs analysed 1007.
—Gage and elevation, instrument for measuring, *125.

-Gage for angle bar *pace, *254 -Gang organization for [Pierce], *329

Track maintenance (Continued):

—Interurban track, Notes on [Oldfield], 567.

—Joint boosters increase life, 131.

—Labor saving machinery pays, *126, 458;

Comments on, 109.

—Machinery used exteosively, *117.

—Progress during 1922 apparent, 11; Comments on, 1;

—Rail filler, Elastic, *488.

—Rebuilding track in paved atreet [Pierce], *329. *329.
Statistics of, Comparative tabulation, 51; Comments on, 4.
Switch point protector, *132.
Switch thawing apparatus, *256.
—Tamper, Air driven, *134.
—Trolley rail height gage, 420.
—Welding, Thermit compromise, 378. Traffic investigations: -Automobile versus railway as carrier, 646.
-Baltimore study, Results of, *77; Commeots on, 69.
-Boston Elevated Ry. passenger statistics, 223,
-Detroit Municipal Ry., 508; Comments on, 503.
-Montreal traffic to be studied, 824.
-Newark, N. J. [Eddy], c512.
-New Orleans aystem, Details, *716, 885, 906, *925, *961, *1043, 1079; Comments on, 710. *925, *961, *1043, 1079; Comments on, 710.

-New York, London, Paris and Berlin trausit problems compared [Turner], *79; Comments on, 70.

-Richmond, Va., system studied, *397.

-Study systematized, *951.

-Traffic count made by conductors, *955.

-Yield valuable information, Comments on, 233. Traffic regulation:

—Automobiles in downtown streets, 77; Commets on, 69.

—Loading [Kappeyne], *367.

—Rerouting of ears improves service, 985.

—Richmond, Va., rerouting auggestions for, *397.

—Rush hour load heavy, Presents problem [Potter], 415.

—Rush hour problem [McCanta], 415.

—Schedule visualized by board, *553.

—Sport haul bus routes approved, 388.

—Springfield Street Ry, rerouting suggested, 309.

—Sydney, Australia, faces difficult problem, *71.

Traffic stimulation (see also Merchandising trans-Traffic regulation: Traffic atimulation (see also Merchandising transportation). -Amusement park pays, *157.

-Automobiles stored during snow period, Comments on, 547.

-Beach resort to support new railway line, *737. Transfers (see Fare collection). Transformers (see Power distribution).

Transportation, Metropolitan:

—Articulated trains suggested for Detroit, *729.
—Automobile asturation, Comments on, 789.
—Boston, Mass., Problem analyzed, 201.
—Busea cannot replace street ears in New York City [Beeler]. *87.
—Busea for short hand service, 301, 388; Comments on, 632.
—Detroit plans, 422, *489, 616, 695; Comments on, 940.
—Elevated structure, cost of, 3, 103.
—Liverpnol, Glasgow and Edinburgh, Report on [Turner], 1039.
—Los Angeles transit plans, 180, 307, 497, 534, 542, 575, 641, 661, 698, 735, 779, 865, 084.
—New Orleans system studied, Details, *716, 885, 906, *925, *961, *1043, 1079; Comments on, 710.
—New York, Londou, Paris and Berlin problems compared [Turner], *79, 153; Comments on, 70.
—Philadelphia plans, 220, *382, 690, 615, 696, 858, 1017.
—Pittsburgh rapid transit plan progressing, 360, Railways as means, Comments on, 1032.
—Richmond, Va., organization and service reports, 243, *307; Comments on, 233.
—Shanghai, China, railways and wheelbarrows compete, 767.
—Subway suggested for Chicagn, 489, 938; Comments on, 151.
—Trailer on, 151.
—Trailer discontinued in London, 186.
Tri-City Ry, (see Davenport, Ia.). Transformers (see Power distribution). Transportation, Metropolitan:

Tri-City Railway of Ill. (see Rock Island, Ill.). Trinidad. Colo.: Trinidad Electric, Transmission & Railway Co.:
Replacement of line by buses sought, 1064.
Trolley buses (see Trackless trolleys). Pucks:

Bolts, Heat treatment betters [Signor], *48*,

Moved under own power in repair shop, *330,

Noiseless construction, *751; Comments ou,

749, 832. 749, 832.

Overhauling methods, Survey of 50 shops, *833; Comments on, 831.

—Pedestal reinforcement, *420.

Repairs (see Repair shop practice).

—Spring base long, New design, *488.

—Strengthened by adding bar, *814.

—Tranafer from pit to pit, Apparatus for, *337.

Twin City Rapid Transit Co. (see Minneapelis, Minn.). Twin State Gas & Electric Co. (ace Brattleboro, Vt.).

Tygarts Valley Traction Co. (see Grafton, W. Va.). U Unemployment (see Employees and Labor). Union Street Ry. (see New Bedford, Mass.). United Gas & Electric Corp. (see New York City).

United States Chamber of Commerce:

-Annual convention:
Proceedings, 809; Comments on, 709, 790.
Program, 693.

-Cunmittee appointments, 609.

—cummttee appointments, 609.
Union Traction Company (see Anderson, Ind.).
Union Traction Co. (see Santa Cruz, Cal.).
United Electric Rys. (see Providence, R. I.).
United Light & Railways Co. (see Grand Rapids, Mich.).

Valuation (see Appraisal of railway property). Vancouver, B. C., Can.:

-British Columbia Electric Ry.:
Annual report, 740.

Bus line deficit shared by city, 551.
Car struck by freight train, 97.

Virginia Railway & Power Co. (see Richmhond, Va.).

Va.j.
Virginia, State of:
—Utility taxation discussed [Forward], 279.

Wage decreases:

-East Liverpool, O., 817. -Emergency wages abandoned in Buffalo, 344.

Wage increases:

—Alton, Granite & St. Louis Traction Co., 937.

—Beaver Valley Traction Co., 978.

—Brooklyn City R.R., 1099.

—Biffalo & Lake Eric Traction Co., 819.

—Citizens Traction Co., 779.

—Cleveland Ry., 735, 779, 898.

—Community Traction Co., 897.

—Detroit, Increase sought, 657, 777, 1058.

—Fresno Traction Co., 819.

—Indiana, Columbus & Eastern Traction Co., 869.

—Los Angeles Ry., 738. Wage increases: -Indiana, Columbus & Eastern Traction Co., 869.

-Los Angeles Ry., 738.

-Market Street Ry., 738.

-Memphis Street Ry., 695.

-Milwaukee Electric Railway & Light Co., 380.

-Minimum wage increased in Birmingham, Ala., 977.

-New York State Rys., 938, 978.

-Northern Ohio Traction & Light Co., 819.

-Pacific Electric Ry., 777.

-Philadelphia Rapid Transit Co., 979.

-Pitshurgh Rys., 898.

-San Diego Electric Ry., 576

-Southern Indiana Gas & Electric Co., 977.

Wages and working agreements:

-Berkshire Street Ry. agitation, 1956.

-Boston Elevated Ry., increase demanded, 1998.

-Capital Traction Co. agreement, 656.

-Chicago increase with day off demanded, 819, 900, 939, 1020, 1055.

-Connecticut agreement renewal, Wage increase demanded, 860, 1018, 1099.

XV--Conspectus of indexes, 187, 348, 539, 740, 903, 1062.

--Des Moines award may cause strike, 1096.

--Eastern Massachusetts Street Ry. to arbitrate, 819.

--Financial reward for good work discussed (Pellissierl, 251.

--"Living wage," Labor board report, 884.

--Minneapolis demands, 1058.

--New York state companies reach agreement, 778.

--Ottawa dispute 1278. 778.

Ottawa dispute, 976.

Piece-work plan for shop repairs, *443; Comments on, 436.

Pittshurgh demand modification asked, 656, -Pittshurgh demand modification asked, 0.00, 778
-Scranton, Pa., Arbitration approved, 616, 1019.
-Tabulated over ten-year period, *23, -Tri City Ry., arbitration, 1017, -Wages based on cost-of-living, *141.
Waiting stations (ase also Terminals).
-Passenger and freight accommodations combined, *156.
-Baltimore terminal, Details of, 549.
-Chicago Elevated builds new statinn, *422.
-European practice [Kappeyne], *367.
Warsaw. Ind.: Warsaw, Ind.:

-Winona Interurban Ry.:

Freight exchange with railroad, 62.

Washington, Baltimore & Annapolis Electric R.R.

(see Baltimore, Md.). Weekly pass (see Fares). Western Ohio Ry. (see Lima, O.) Westerly, R. I.: West Penn Rys. (see Pittsburgb, Pa.)

(see Baltimore, Md.).

Washington, D. C.:

—Capital Traction Co.:

Annual report, 941.

Buses replace trolleys which interfered with scientific apparatus, 497.

System has interesting features [Dalgleish].

*235.

Wage agreement, 656.

Wheel removal equipment [Squier]. *447;

Comments on, 437.

—Fare controversy, 195, 388, 428.

—Merger not fare solution according to commission, 301.

—One-man car restriction recommended, 865.

—Railway traffic report, Local lines, 60.

Washington Railway & Electric Co.:

Maintenance, Systemization pays [Dean].

*317.

One-man car instification sought, 429, *601. *317.
One-man car instification sought, 429, *601.
Rail weld withstands test. *531.
Safety campaign car, *849.
System criticized by senators, 309.
-Washington, Virginia Ry.:
Pass sales campaign defeats buses, 1064.
Weekly pass introduced, 825. weekly pass introduced, 829.

Washington, State of:
—Municipal bus operation bill before legislature, 226.
—Public information committee found by utilities, 221. Weekly pass (see Farea).
Welding:
—Aluminum, Metal for welding, 340.
—Arc-welding equipment, Tranaportation of, *95.
—Chrome-nickel steel successfully welded [Hibbard], *461.
—Compressor shafts, *124.
—Gas regulator, High pressure, *1094.
—Rail joints by thermit process, 337.
—Rail joints, Tests of Boston Elevated, *555.
—Rail made positive pole, 936.
—Rail preheater, *573.
—Rail, Thermit weld, unchanged in ten years, *687.
—Special track work repaired economically, 614.
—Specifications of A. W. S., Comments on, 992.
—Stresses dangerous, Comments on, 316.
—Thermit compromise welds, 378.
—Thermit welded rail joint withstands tests, *531.
—Voltage control device for D. C., 132. *531.
-Voltage control device for D. C., 132.
-Welder, D. C., Arc automatically breaka, *692.
-Wheelbarrowa improved by, *378.
-Wheels, Flanges worn, Salvaged [Merten], *679. Abandonment of line proposed, 629.

Wheels and axles:
—Old axles. Uses for, 420.
—Repair shop layout [Hochette], *215.
—Repairs (see Repair Shop Practice):
—Teak segments decrease noise, *751: Comments on, 749, 832.
—Test catches flaws [Dean], *318.
—Tread width, Canvass of opinions, 856,
—Wheel removal, Methods and equipment [Squir], 447; Comments on, 437, 831.
—Wheels, Worn flanges, Salvaging [Merten], *679.

---Wheels,

Wichita, Kan.:
—Arkansas Valley Interurban Ry.:
Electrification plans not complete, 697.

Windows (see Fixtures).

Winona Interurban Ry, (see Warsaw, Ind.)

Winona, Minn .:

Wisconsin Railway Light & Power Co.: Automobile accidents, Study of [Howard]. 570.

Traffic relief plan, 905

Wisconsin Gas & Electric Co. (see Kenosha, Wis.)

Wisconsin Public Service Co. (see Green Bay, Wis.)

Wisconsin Raifway Light & Power Co. Winona, Minn.)

Wisconsin, State of;

—Railway situation [Pulliam], 565

—Utilities expanding, 657.

—Utility financial information sought by legis-lature, 185.

Wisconsin Utilities Assn.;

—Annual convention;

Papers and proceedings, 565.

Program, 376.

—Ten safety rules, 743.

-Ten salety rules, 743,
Wood preservation;
—Oils for [Hartman], 298,
Worcester, Mass.;
—Worcester Consolidated Street Ry.;
Power saved by use of recorders, 531,
Work and wrecking cars;
—Crane car, Interchangeable hoisting booms,
**960.

-- Electric crane car with one trolley pole, *337.

-- Snow plow attachment for Differential Car.
*217.

Sweeper broom core construction, * Sweeper, Chainless, Construction Sweeper, *1977. details.

Working agreements (see Wages and Working Agreements), Wrecks (see Accidents), Work and wrecking cars:
—Snow plows (see Snow Removal).

Y

Youngstown, O.:

—Pennsylvania-Ohio Electric Co.:

Bus substitution for railway sought, 825.

Interurban "motor coach" service successful [Seely], 169.

One-man car operation statistics [Graham],

168.

-Railway or jitney? 617.

-Youngstown Municipal Ry.:
Fare increase necessary, 824, 1026.
Ties, Steel, Wear well, *850.
Weekly pass discontinued, Bus lines started, 542, 918.

-Youngstown & Suburban Ry.:
Bus route established, 865.
Cars, Double truck, One or two man operation, Details of [Dewhurst], *181.

Zone fare systems (see Fares).

AUTHOR INDEX

B

Babcock, A. H.:

—Fuel determinations on Southern Pacitic steam locomotives, 770.

Bale, L. D.:

—Automatic substation experience in Cleve-land, *350, *405., *477.

—Progress and prospects in electric railway engineering, c122.

—Proposed automatic substation in Cleveland will be economical, c564.

Baluss, Hamilton:
—Suggestion to prevent theft of incandescent lamps, c650.

Bamberger, Julian M.:
—Preventing theft of lamps, c683.

Barnes, James P.:

Co-operation, Publicity and Service, 570.

Barton, Bruce:

—And there arose a new king which knew not Joseph, 967.

Baxter, A. R.;

—Merita of the company publication, 525.

Beeler, John A.;

Buses could not fill place of street cars in New York City, 87.

Bland, Fred:
—European and American trackwork practice compared, *c89.

compared, "cs9, Blair, Edward J.:

-Employees trained for executive positions. 565.

Blinn, A. C.:

-Bus operation in Akron, Ohio, 165, Comments on, 152.

Boeken, Fred:

-Traffic development, competition and property depreciation, 415.

Bolt, W. C.:

—Testing car air reservoirs, *851.

Boyce, W. H.:

—Weekly pass auccess in New Rrighton, Pa., 200.

Broten, O. A.:

Broten, O. A.;

—Pneumatic operation of doors and steps, 568.

Bodd, Britton I.;

—Public opinion and the steam railroad situation, 731.

—Training young engineers in utility work, 515,

—What of 1923? †5.

Ruffe, F. G.:

—A foreman's relation to his men and his company, 137.

Burroughs, Dwight W.:
-Educating "Rill Jones," 1089.

Butcher, C. A .:

—Automatic and semi-automatic substations for electric railways, 173.

Candy, A. M: —Cutilng metals with the electric arc, 332. Charters, H. J.:
—Signal maintenance on an Oregon railway
*468.

-Unusual block signal installation, *652

Clarity, W. J.:

—New 180 ton passenger locomotives for the
New Haven, 412

Clark, L. M: Lubricating railway motors, 175.

Coates, Frank B.:
—Improve the service—reduce the leaks, †7.

Colby. A. C.:

--Number of conductors on three-car train is purely an operating question, c889.

purely an operating question, c88v.

Coffey, Alden:
—Human maintenance in Industry, 1050.

Coolidge, Calvin;
—Country past peak, 282.

Cram, R. C.:
—Economical elevated rallway construction in Brooklyn, c513.
—Pioneers in the development of the Engineering Association, c411.

Crane, C. F.:

Crane, C. F.:

Comments on Electric Railway Journal, 372. "Critic":

-An automobile with slat seats, c90,

Daigleish, R. H.:
—Points of Interest about the Capital Traction
Company, *235.

Dana, Edward:
—Labor costs in Boston and Philadelphia, c480.

Davenport, Frederick M.:
—Electric rallway taxation, 277.

Davison. Alfred T.:

—How should railways be taxed?, 280.
Davis Cassins M.:

—Full and semi-automatic va. manual operation for substations, 171.

Davis, George H.:

—Co-ordinated operation of street cars and buses urged 1035.

Davis, L. J.:

—Motor lubrication difficulties, 207.

--Motor lubrication difficulties, 207.

Dean, Juhn S.;

--Careful and systematic maintenance is a paying investment, *317.

--Convenient tackle aids in dipping armstures, *778.

--Copper vs. phospher bronze for brushholder contact tips, *485.

--Dipping and baking armsture coils, *652.

--Maintaioing electric railway motors, *111.

--Ovens for baking railway motor armstures, *684.

--Reducing armsture failures over 50 per cent

De Camp, H. C.: —Emergency stops, 172.

Dewhurst, John A.:

—Features of the Youngstown & Suburban Cars, *181.

Cars. *181.
Dodd, J. N.:
—Signaling on the Frankford Elevated, *711.
**761.
Döry. Ivan:
—A. C. Locomotive control, *199.

Druen, D. E.;

—Power generation costs reduced 35 per cent.

•430.

E

Eddy, H. C.:
-Traffic congestion in Newark, c512 —Traine congestion in Sewark, col2.
 —Rephaltic concrete base makes possible rapid paving program, *843.
 —Breefix of subdividing operating expense accounts, 1045. Elliott, Clifford A.:

—Road oil tank and kettle, *94.

—Shop-constructed hydraulic press, *484.

— Snop-constructed hydraulic press, *484.

Elwell, Charles C.:

—Railway and motor bus regulation, 275.

Emmons, C. D.:

—Conditions in industry, 10.

—Industry coming to better days, 283.

"Engineer":

Xidea observe steel for resolutions have -Nickel-chrome steel for special trackwork, c122.

"Executive": an theft of electric light bulbs be pre-vented? c512.

F

Fall, Albert B.:
—Good citizenahip a necessity, 288.

Farwell, Stanley P.:
—Stores and inventory methods, 510.

Fenner, D. C.;

—Regulation of motor vehicle common carrier, 208.

Fitzgerald, Thomaa:

Tax agreement between Pittsburgh Railways and city, 287.

Forward, Alexander:
-Taxstlon and regulation, 279.

Fowler, Sam B.;
—Northern Texas has new loterurban, *591.

Fuller, F. I.:

-Way construction experience in Portland.

*639.

Funk, Niel W.:

—The authority, duties and responsibilities of the safety chairman, 213,

G

Genest, R. B.:

--Handling and salvaging of cement hags, *483,

--Cost accounting in the engineering department, *755, *797.

George, Howard H.:

--It pays to treat wood poles and ties, *1002,

--Pavement problems, No common solution,

1050,

— Way engineer emphasises the importance of wood preservation, e808.

Glover, M. W.:

— What accountants' association has done, 365.

Goldsborough, S. L.:

—A relay which almost thinks, *930.
Golladay, L. R.:

—Maintenance of car-type electrolytic lighting arresters, *418.

Goodsell, C. B.:

—Advantages of Americanization of railway employees, 514.

Gottschalk, Otto:

—The kind of traction system serving Havana,
Cuba, *1081.

Gould, L. E.:
—Saving energy by training motormen to handle light cars, c503.

Graham, Richard N.:
—One-man ear operating figures from Youngstown, 168.

Greenland, S. W.;

—Railways must take bold action in studying their problems, 100.

—Weekly pass, Fort Wayne trial successful, 206.

Gunn. E. B.:

—Results obtained with high-speed light weight interurban cars, 135.

Н

Harding, Warren G.:
—Message to A. E. R. A., 287.

Hartman, Ernest F.:

—Preservative oils for wood preservation, 298.

Hayes, Henry R.:

Governor Smith's recommendations criticized, 136.

Heath, A. W.:

--Monthly freight journal entries, 522.

Hihhard, F. G.:
—Chrome-nickel steel in special work, *461.

—Chrome-nickel steel in special work, *461.

Hochette, H. E.:

—Rearranging wheel and axle shop for lower cost and higher production, *215.

Howard, R. M.:

—The problem of collisions between cars and automobiles, 570.

Humphrey, Churchill:

—Franchises, Historical background, 166.

Hungerford, Edward:

—The outsiders view of what sells transportation, 1087.

Hurley, Edward N.:

—Public ownership of utilities, 213.

I

Irvine, R. J.:
-Railways provide pavement for trucks, 891. Ives, J. Moss:
—Taxes heavy burden, 287.

J

Jackson. Walter:

—About the Detroit builetins, c564.

—The sale of the ride, 517.

—The selling principle of the weekly pass, 176, 266.

Jefferey, J. G.:

—Merit system works well in Los Angeles, 721.

—Working off the rough edge on prospective motormen, *1037.

K

Kappeyne, J.:
—Merchandising transportation abroad, *367.

Kavansgh, James E.:

—Employees' insurance and pension funds, 1689.

Keller, Charles:
—Relations of utilities and commissions, 276.

Kindler, E.:
—Reconstructing cars in Berlin, *136.

Krock, Arthur:
—Newspaper publicity for railways, 164.

L

Lintern, J. M.:

"Thought—work—character"
maintain leadership, c250. essential to

Lucas, J. H.:

—Three-car Detroit train compared with two-car Milwaukee train, e809.

M

MacMurray, G. J.:
—Over the road with Father Time, *31.

Malibie, W. H.:
—Tsxes, Who pays them? 287.
Marshall, Thomas Riley:
—Railways, General comments, 288.

McCants. M.:

—Rush hour problems and transfer system, 415.

-Rush now. P. S. McCarter, Thomas N.:
-Public meetings with good results, 286,
-Public meetings from serious conditions,

McCune, Joseph C.:
—Recent air-brake developments, *54.

- Recent air-trake developments, *54.

McKelway, G. H.:

— Sectionalizing overhead special work, 896.

— Should trolley poles be raked? 482.

— Supporting trolley wire at short intervals.

— Three simple signal systems, 852.

Meriwether, Richard:
—Merchandising transportation, 932.

Merten, W. J.:

—The salvage of worn steel car wheels, *679, Morgan, Clinton E.:

—The one-man car an economic need, 167.

Morrow, C. E.:

—Prospects for electric railway financing in 1923, 24.

Mortimer, J. D.:

Reasons for trial of chrome-nickel steel for special trackwork in Milwaukee, c608.

Mullaney, B. J.:
—Public relations bettered, 515.

Murray. Thomas:

—Information on steel tie construction desired, c250.

O

Oldfield, Alfred A.:
—Interurban track maintenance notes, 567.

Osborn, W. B.:

—Connecting armatures on the ground side, c650.

P

Peery, R. R.:

--General accounting with bookkeeping machines, 413.

Pellissier, George E.:

—Co-operation may be stimulated, 251.

Pierce, A. E.:

—Method and cost of reclaiming Seattle paveous tracks, *329.

Pond, H. C.:

—Not practicable to manufacture left hand thread lamps, c768.

thread lamps, c708.

Porter, J. T.:

-Reclamation work reduces maintenance expenses, 931.

Potter, J. P.:

-San Francisco rush hours heavy, 415.

Potter, W. B.:

Observations on Europeon traction, *292.

Prescott John Adams:
—Community interest between railways and bankers associations, 281.

Price, C. W.:
—Carrying safety to the public, *865, *847.
*883, *928, *964, *999, *1041, *1083.

R

Rice, H. J.:

—Individual motor drive improves shop effi-ciency, *475.

Robinson, H. M.:

—Reducing lubrication costs, *119.

-Acqueing Indrication costs, *119.
Rnsevear, M. B.:
-The power distribution system and its maintenance, *453.

Rouse. William;
—El Paso foremen profit by vocational training,
*849.

S

St. Clair, Labert;

—Jack-in-the-pulpit is succeeding the shrinking violet, 526.

Sanders, E. B.:

—Exchanging ideas on publicity work, 794.

—New cars embody unusual features, *402.

Sauvage, W. H.:

—Maintenance of automatic slack adjusters,

*486,

Sawyer, W. H.:

—Better public relations, †9.

—The future of the electric railway business,

518.

Schrey, Franz:

—A wagon with auxiliary flanged wheels,

e*1049.

Seely, Garrett T.;

—The use of the interurban bus, 169.
Shannahan, John N.;

—The bus as a common carrier, †5.
Shappert, F. W.;

—Some pointers on soliciting traffic, 569.

Shepard, E. R.:
—Some new light on electrolysis, *597.

Signor, Harry L.:

-Heat-freated bolts, *484.

-Soldering railway armature coils to commutator, *815.

Smith, C. C.:

--More about pavement heaving outside of track area, c889.

Smith, Homer K.:

Heavy traction service records, 44.

Squier, C. W.:

-Methods and equipment for removing wheels,

*447.

Stinemetz, W. R.:
—Electrification largely a financial problem, 855.

Stoll, Joseph A.:
—Baltimore vehicular traffic study, *77.

Swartz, A.:
—Preventing pavement heaving outside the track area, c769, c*889.

T

Telluright, F. Douglas:

—College men in the transportation department, e683.

Thirlwall, J. C.:

nortwan, J. C.: French progressing with electrification projects, 410. -When the bus will replace the urban railway,

-When t

c650.

Thompson, C. E.:

Manufacture of electric railway equipment, 516.

Trumbull, Robert G.:

The college man in the transportation department, c563.

Turner, Daniel L.:

—Liverpool, Glassow and Edinburgh transportation facilities compared, 1039.

—New York London, Paris and Berlin transit compared, *79, 153.

—Street space occupied by cars and buses, 957.

Wadsworth, W. H.:
—Concrete ties satisfactory in Chickssha, c730.

—Concrete ties satisfactory in Chicksha, e750.
Walker, E. M.:
—One-man cars, 164.
—Sixty weeks of pass riding, 1086.
—Weekly pass successful on Terre Haute Traction system, 206.
Wefel, W. C.:
—Bayonet sockets would prevent lsmp thefts, c768.

Wheelwright, Thomas S.:
—Virginia needs state regulation of utilities, 286.

White, Francis J.:
——Specifying the sizes of stranded conductors, c90.

Whitney, Albert W.:
—The need for industrial standardization, 607.

Wl'de. Elton S.:
—Collisions as the motorman sees them, 890.

-consions as the motorman sees them, observed wilder, J. S.:

-Convenient track shop kinks, *814.

-Cross bonds with iron pipe terminals, *688.

-Device for testing gage in switches and on eurves, *653. Wo'f, Lenn L.:
—Spray painting of electric railway cars, 732.

Wyati, R. H.:

—Marketing your own commodities, 170.

Abbreviations: *Illustrated. c Communications.
READ THE INSTRUCTIONS AT THE BEGINNING OF THE INDEX

PERSONAL INDEX

(with biographical notes)

Α	Doolittle, F. W	L	Roberts, E. A
Adams, Benjamin C. 987 Adams, W. B 311	Dunham, W. R. Jr		Robertson, Arthur W 6d Rossman, F. F
Allen, Elbert G 945	r	Le Boutilher George 312	Rossman, F. F
Anderson, A. J *785	E	Locke, Dean J	6
Andrew, James D 784		Longina, J. L	S .
Andrews, Lincoln C *192	Elwell, David	M	Sachse, Richard
В		MaDanal W E	Saylor, George A 432
	F	MeDanel, W. F	Searles, J. I 785
Barber, A. B 352		McIlraith, E. J 626	Shartel, John W
Barnes, J. P	Fankhauser, W. C 785	McMahon, D. D	Simonds, O. H
Bennett, Harrah K *946	Farrand, Dudley*704	McWhorter, A. D	Smith, C. D
Bertke, W. J	Farrell, A. M 108	Mack, H. L	Smith, J. C
Biblins, J. Rowland 312, 513	Feiker, F. M626, 1068	Masengill, W. T	Snyder, D. W
Bigelow, Charles H 828	Flowers, H. B	Menden, William S	Snyder, Florence 988 Sparks, Ralph M 585
Blasing, W. A 196		Merrill, Edward D 106	Spreckels, Claus
Bradley, Leon C. 828 Bradner, E. A	C	Merrill, Edward M 665 Miller, John A. Jr 354	Steinberg, E. J 784
Brown, F. H	\mathbf{G}	Mitten, Thomas E	Stevenson, E. G
Brown, Frederick W		Muffley, R. M	Street, O. D
Brown, Harry L *65	Gaboury, Arthur 391 Geisse, H. L*627	Murphy, James H	_
Buck, Morris	Gerke, J. W	Siyers, A. B	T
Burley, V. W	Gerth, Carl P		
Burns, E J	Gill, Joe H	N	Taylor, J. Claire*744
Butler F. L	Gingras, A. A967		Taylor, W. H
		Near. R. G	
С	Н	Nicholson, Joseph W. *391 Nyman, Ralph R 585	Thorn, Wray T
С		Nicholson, Joseph W *391	Trumbower, Henry R 780
Cadle. Charles L 229	Hamilton, F. M. 988 Hansen, Olaf J. •744	Nicholson, Joseph W *391	
Cadle, Charles L. 220 Carmody, J. A	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867	Nicholson, Joseph W *391 Nyman, Ralph R 585	Trumbower, Henry R 780
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311	Nicholson, Joseph W *391 Nyman, Ralph R	Trumbower, Henry R 780
Cadle, Charles L. 220 Carmody, J. A	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867	Nicholson, Joseph W	### Trumbower, Henry R 780 ###################################
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584	Nicholson, Joseph W *391 Nyman, Ralph R	Trumbower, Henry R 780
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *765 Horton, R. Harland 584 Hulme, J. W. *1027	O'Ryan, Major-General John F. 499 Osborne, H. Z. Jr	Trumbower, Henry R 780 U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohlentz, Emory L. 65	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584	Nicholson, Joseph W	### Trumbower, Henry R 780 U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. *1105 Casey, William M. *228 Chaffee, E. *152 Clark, H. S. *1105 Cobb, Matt L. 392 Cohleniz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *765 Horton, R. Harland 584 Hulme, J. W. *1027	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 229 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohleniz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *765 Horton, R. Harland 584 Hulme, J. W. *1027	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. *1105 Casey, William M. *228 Chaffee, E. *152 Clark, H. S. *1105 Cobb, Matt L. 392 Cohlentz, Emory L. 65 Coffled, Edward J. 785 Coffman, Alvin 808	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584	Nicholson, Joseph W	Trumbower, Henry R
Cadle. Charles L. 229 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohleniz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Haod, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her. Genrgo A. 945	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 229 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohleniz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohleniz, Emory L. 65 Coffleid, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Haod, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her. Genrgo A. 945	Nicholson, Joseph W	Trumbower, Henry R
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohleniz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Haod, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her. Genrgo A. 945	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :382 Collentz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628 D Dahl, Chris *431 Dahl, C. H. *945	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her, Genrgo A. 945 Irelan, S. B. 987	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 226 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohlentz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628 D Dahl, Chris *431 Dahl, C. H. *915 Dahl, Gerhard M. *1067	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Haod, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her. Genrgo A. 945	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. 352 Chark, H. S. *1105 Cobb, Matt L. 392 Cohleniz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628 D Dahl, Chris *431 Dahl, C. H. *945 Dahl, Gerhard M. *1067 Dalgieish, R. H. *455	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her. Genrgo A. 945 Irelan, S. B. 987 J Johnson, J. Frank *745	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 226 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Cohlentz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628 D Dahl, Chris *431 Dahl, C. H. *915 Dahl, Gerhard M. *1067	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her, Genrgo A. 945 Irelan, S. B. 987	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 226 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Collentz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628 D Dahl. Chris *431 Dahl, C. H. *945 Dahl, Gerhard M. *1067 Dalgteish, R. H. *465 Damon, W. H. 987 Daniels, Winthrop M. 808 Davis, A. S. 147	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Haod, R. D. *765 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her, Genrga A. 945 Irelan, S. B. 987 J Johnson, J. Frank *745 K Keller, Col. Charles 786	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 220 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. 352 Clark, H. S. *1105 Cobb, Matt L. 392 Cohlentz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Coffman, Alvin 828 Collier, Rawson 827 Curle, W. J. 628 D D Dahl, Chris *431 Dahl, C. H. *945 Dahl, Gerhard M. *1067 Dalgleish, R. H. *45 Damon, W. H. 987 Damon, W. H. 987 Daniels, Winthrop M. 808 Davis, A. S. 147 Deal, E. C. 101	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Hood, R. D. *705 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her. Genrgo A. 945 Irelan, S. B. 987 J Johnson, J. Frank *745 K Keller, Col. Chartes 786 Kintry, T. D. *628	Nicholson, Joseph W	U Uffert, John F
Cadle. Charles L. 226 Carmody, J. A. *784 Carpenter, E. E. *1105 Casey, William M. *228 Chaffee, E. F. :152 Clark, H. S. *1105 Cobb, Matt L. :392 Collentz, Emory L. 65 Coffield, Edward J. 785 Coffman, Alvin 808 Collier, Rawson 827 Curle, W. J. 628 D Dahl. Chris *431 Dahl, C. H. *945 Dahl, Gerhard M. *1067 Dalgteish, R. H. *465 Damon, W. H. 987 Daniels, Winthrop M. 808 Davis, A. S. 147	Hamilton, F. M. 988 Hansen, Olaf J. *744 Harrington, Michael 867 Hartford, A. W. 311 Hecht, R. S. 586 Haod, R. D. *765 Horton, R. Harland 584 Hulme, J. W. *1027 Hutchinson, Dr. Cary T. 584 I Her, Genrga A. 945 Irelan, S. B. 987 J Johnson, J. Frank *745 K Keller, Col. Charles 786	Nicholson, Joseph W	U Uffert, John F

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January 6, 1923





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RAVEL and contact with other people increases knowledge, broadens experience and improves the vision of things generally. The opportunity for travel to observe the work of other electric railway companies is necessarily limited to officers and a few principal employees. The best substitute is to read and study the happenings and developments in the industry as recorded each week in the ELECTRIC RAILWAY TOURNAL.

Are you making the most of the opportunity this paper brings? The success of every executive depends upon the knowledge, experience, vision, judgment and loyalty of his department heads, and their success also depends upon the same attributes in their staffs and employees.

Do you fully realize the importance and value to your company and the industry as a whole of having the service of a weekly journal, conveying fresh, timely, authentic news and information, data and opinions in regard to all branches of the industry? Do you fully realize that the ELECTRIC RAILWAY JOURNAL is a powerful factor in developing the knowledge, experience, vision and loyalty of every man associated with you? Do you realize that this great service is, without question, the least expensive of any service vou use?

The ELECTRIC RAILWAY JOURNAL is the greatest educational medium serving the electric railway industry. It contains a wealth of usable information and inspiration to new endeavor for every employee all the way through the supervisory forces. It is a veritable College of Electric Railway Work put "right in the Iap" of the men on whom the success of the property depends. By the breadth of their knowledge can the fineness of the transportation produced be proportionately measured. Therefore, be it resolved---

That during 1923 we shall profit more fully by the educational matter placed at our disposal by the ELECTRIC RAILWAY JOURNAL

Some Statistics of



Chilean State Rys. Locomotive



No.508-25 HP Motor



HL Control



New York, New Haven & Hartford R.R.



Cabinet HL Control



Norfolk & Western Ru.



1-Chilean State Railways

Twelve of the 39 locomotives ordered for this 3,000-volt, direct current electrification, and all of the apparatus for the five substations have been shipped. This is the largest foreign electrification contract ever placed in the United States and covers 144 route-miles of track.

2-The Type 508, 25-Hp. Motor

Thousands of type 508 motors are in use on light-weight cars. They have proved rugged and reliable both electrically and mechanically. In a typical installation 300 of these motors operated a total of 12,941,000 motor miles with a record of 680,000 motor miles per armature failure.

3-HL Control

Fifteen years of service have proved the reliability and ruggedness of HL control. It is universally applicable to single cars, trains, light and heavy traction and is used by over 300 railway properties. It has been applied in almost every country in the world with phenomenal success.

4-New York, New Haven & Hartford R.R.

This railroad has ordered 12 more huge high-speed passenger locomotives weighing 181 tons, developing 2,400 hp. and designed for alternating current service, but capable of operating over the 600-volt D.C. zone in New York City. The enormous traffic incident to the Yale-Harvard football game was handled over this electrification, with a schedule of 94 special trains involving a train arrival every 2.1 minutes. This is a wonderful demonstration of the capacity of the high voltage alternating current system for great overload.

5-Cabinet HL Control

Cabinet HL control is an adaptation of standard HL control with no radical departure from the designs that have proved so effective during 15 years of service. It is designed for convenience and accessibility and is suitable for installation above or beneath the car floor.

6-Norfolk & Western Railway

This railroad has ordered 4 more double-cab alternating current split-phase electric locomotives for heavy-grade freight service. They will weigh 382 tons and develop 4,000 hp. Two of the new locomotives will pull 4,200 tons up a 2 per cent grade at 14 miles per hour, and have 30 per cent greater capacity than any electric freight engine operating.

Westinghouse Electric & East Pittsburgh,

ccomplishments

WESTINGHOUSE ELECTRIC

7-Frankford Elevated

Every subway and elevated railway system in the United States employs HL multiple-unit control. Equipment purchases for the Chicago Elevated and the Frankford Elevated (the latest rapid transit system) include HL control.

8-Paris-Orleans Railway (France)

As a result of an exhaustive study made of control equipment throughout both Europe and the United States, orders have been placed for 120 HL locomotive-control equipments. This is the only equipment in its entirety to be purchased outside of France for this 145 route-mile electrification.

9-Electric Freight Haulage

1922 marks the beginning of a more extended use of freight haulage by the electric railways in the United States. The industry may proudly boast of the strides it has made to date and the plans laid for the future.

10-Pennsylvania System

The Pennsylvania Railroad has ordered three large electric locomotives in preparation for future electrification. These will weigh 200 tons each, and have a capacity of 4,000 hp. and are built for operation on the 11,000 volt alternating current system. They will be operated in both freight and passenger service. For operation in heavy suburban service outside of Philadelphia, this company has ordered 15 new alternating current multiple unit equipments. There are at present in operation on this 30 miles of electrified line 115 multiple-unit equipments.

11-Trolley Bus Foot Control

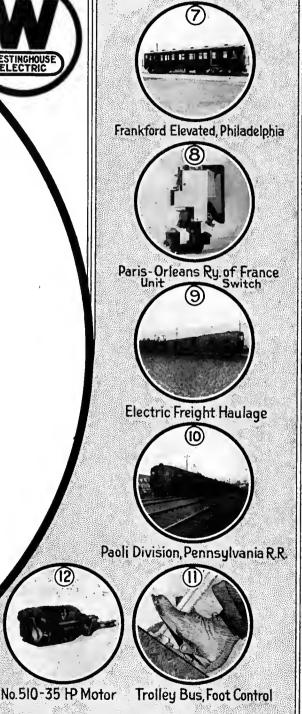
Trolley bus transportation now employed by six operating companies in North America, is rapidly demonstrating its economical field. Foot control, which has been so successfully employed in the automotive industry, has demonstrated its superiority for electrically operated buses.

12-Type 510, 35-Hp. Motor

The Type 510 motor has been perfected and applied extensively during 1922. It lends itself particularly to the operation of light weight, double-truck cars for the handling of heavy traffic in large metropolitan districts.

Manufacturing Company

Pennsylvania





Westinghouse Varnish

Everyday in the Westinghouse shops hundreds of motor armatures for railway service receive their first bath of Westinghouse insulating varnish.

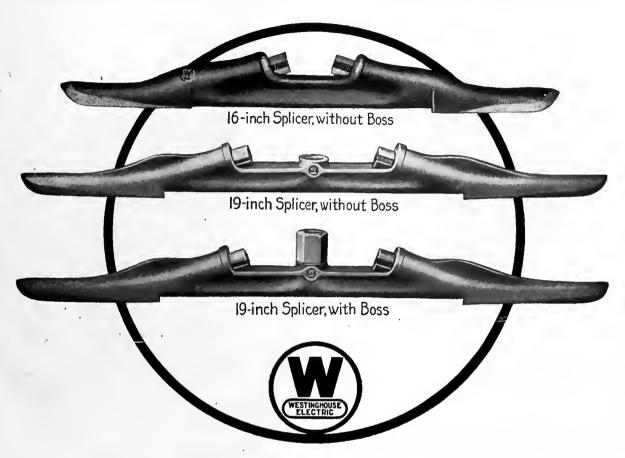
These motors are called upon for the most exacting service. Armatures must be especially treated to give the satisfaction expected of a new motor.

The varnish used for these motors is the best that research has developed for dipping and baking armatures. It is the varnish that service has proved to be the best for lengthening the life of armatures.

Use Westinghouse Varnish for all your dipping and baking requirements.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse-Cleveland Splicers Designed For The Severest Service



Westinghouse-Cleveland Splicers are easily and quickly installed, and are neat in appearance. They are 50 per cent stronger than strongest trolley wire. The metal in the body of the splicer is so distributed as to give better wear, and the maximum strength with the minimum weight of splicer.



Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.



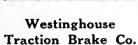
Electric railroad executives are taking great interest in Westinghouse Automatic Sub-Station Switching Equipment as a way to reduce excessive operating costs.

Perhaps the most important advantage, in addition to labor economy, is the absolutely reliable protection given to expensive equipment and to service by automatic operation.

Since Westinghouse Automatic Switching Equipment is combined into a unit Switchboard, practically all wiring is done at the factory, thereby reducing installation costs to an absolute minimum.

For full information, write to

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania



Products

BRAKES FOR EVERY CLASS OF SERVICE

Schedule SM-3 (Straight Alr)—For single cars in light, slow-speed city service.

Schedule SME (Semi-Automatic)—For single cars or two car trains in city service.

Schedule AMM (Combined Automatic and Straight Air)— For single cars or short multiple-unit trains in heavy city, suburban or interurban service.

Schedule AMU (Automatic)
—For long trains in bigh-speed interurban elevated or subway service.

Schednle AMUE (Electro-Pneumatic)—For trains of any length in rapid transit, elevated or subway lines.

Variable Load Brake—For trains of any length on elevated or subway systems. Same as AMUE, plus features for varying brake cylinder pressures os st to obtain uniform retardation on empty, partially loaded, or fully loaded trains.

AIR COMPRESSORS

For Traction Service—DH
"Bumgalow" type, 10 to 25
cu, ft. displacement; DF type,
15 to 38 cu. ft. displacement;
other types to meet special requirements.

Industrial Service—All types and sizes from 11 to 550 cu. ft. displacement; s.c. or d.c. motor; recommended for power stations, car barns, shops, yards, etc.

"TIGHT-LOCK" AUTOMATIC COUPLERS

Car and Air, or Car, Air and Electric Couplers for all classes of traction service.

"WABCO" PACKING CUPS

For air brake cylinders, door control engine cylinders, etc. Air Brake Hose, Conplies and

Car Signal Equipment

Air Whistles Air Cut-out Cocks

Air Cut-out Cocks

Brake and Operating Air Valves

Automatic Slack Adjusters Air Strainers

AN AUTOMOTIVE AIR BRAKE

A new development providing better braking facilities for the safe and efficient operation of Motor Buses, Trucks, Touring Cars, Trackless Trolley Cars and Rail Motor Vehicles.



Vour Dequirements

PROMINENT among your requirements for 1923 will be the right kind of equipment to enable you to take full advantage of the opportunities for profitable operation that the New Year offers.

Westinghouse Traction Brake products represent a line of equipment that is essential to successful railway operation — equipment of known quality which will meet your highest requirements in every detail.

Consult the list on this page, check off the items which will help you to realize your plans for better service and increased earnings, then have us send one of our representatives to talk the matter over.

Westinghouse Traction Brake Company General Offices and Works: Wilmerding, Pa.

OFFICES:

Boston, Mass, Chicago, Ill. Columbus, O. Denver, Colo. Houston, Tex. Los Angeles Mexico City St. Louis, Mo. St. Paul, Minn. New York Pittsburgh Washington Seattle San Francisco



WESTINGHOUSE TRACTION BRAKES



It's Surprising What An Old Car Will Do!

BREATHE new life and earningpower into those old-type cars. Cut down the excessive operating cost. Turn losses into profit by the Safety Car plan.

It's surprising what an old car will do when equipped for Safety Car operation.

The above photograph is that of an old two-man, double-truck unit,

weighing 44,000 pounds and seating 44 passengers, which has been converted for one-man operation with the usual satisfactory results. Note the rear door control exercised by the operator through the use of the new Selector Valve.

Old cars of almost any size or type can be made over into Safety Cars at a very nominal cost. Consult us for further details and advice.



We furnish the Air Brake and Safety Car Control Equipment which makes the Safety Car

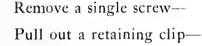
O-B Trolley Base





O-B Farm 1 Base (Patented)





Lift-

And every vital part of O-B Base is exposed—exposed for lubrication, for inspection, for repair.

It is a hard job that a trolley base has. There are shocks and bangs and twists and strains all the time. So even the O-B Base needs attention occasionally. Because maintenance is so easy, O-B Base gets the care that it deserves.

This is only one of the good features of O-B Base.

May we tell you more about it?



All points of principal wear, on O-B Base, are equipped with renewable bushings shown dark an the photograph.



The Ohio Brass Co. Mansfield, Bohio, U.S.A.

New York Philadelphia Pittsburgh Cherleston, W.Va. Chicago Los Angeles San Francisco Paris, France Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators



Shows the men how it's done in Baltimore, Cleveland, Detroit, Toledo and Youngstown.

We have a 1500-ft. film showing real track construction work in Baltimore, Cleveland, Detroit, Toledo and Youngstown, demonstrating latest methods of track work—special equipment—novel methods.

We have a skilled operator equipped with a portable projector. He will come to your office. In 30 minutes he will take your organization over some of the finest steel-tie track

The Internationa

Cleveland



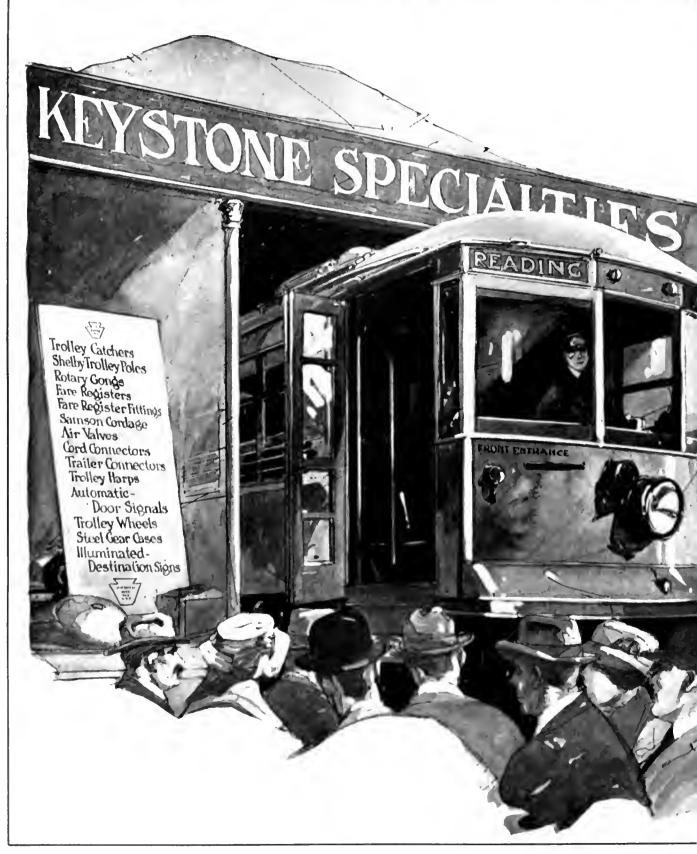
construction work in the world. It's full of action—full of information—intensely interesting.

Every man present—executives, engineers and track men—will get ideas of incalculable value to your company.

Write us quick—the exhibition won't cost you a cent—the only thing the operator needs is a lamp socket—and the film, for safetys' sake, is non-inflammable.

Steel Tie Co.

Your Cars Are



Your Salesmen

Keep them fit!

If you want your cars to make a good impression on the public they call on for business, equip them with Keystone Car Specialties, which mean:

Destination Signs (Keystone-Hunter) that are easy to read at a convenient distance day and night.

Headlights (Golden Glow) that penetrate without annoying opposing traffic and that can be detected in the maze of traffic blocks away.

Interior Illumination (Safety Lighting Fixtures) that affords your passengers thorough eye comfort minus rattling fixtures.

High Voltage Signalling Systems (Faraday) that are convenient and unfailing, that permit passengers to tell the motorman when and where to stop.

The thousand-and-one necessities such as Gear Cases, Air Sanders, Trolley Poles, Trolley Catchers, etc., that sell you as a practiacl railway operator to the men on your platforms, the men in your repair shops and the people who ride in your cars.



Faraday High Voltage Car Signal System



Keystone-Hunter Illuminated Signs



Golden Glow Headlights



Safety Car Lighting Fixtures



Operators, send in your name and we will send to you a set of data sheets on any of these specialties in which you are interested.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK 50 Church Street CHICAGO Monadnock Bldg.

Bronch Offices: Boston, Scranton, Pittsburgh

Canodion Distributors:

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

Insurance plus Marsh & M-Bennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

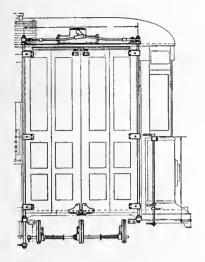
Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & MCLENNAN 175 W. Jackson Blvd. Chicago, Ill.

Minneapolis New York Detroit Denver Duluth Columbus San Francisco Seattle Cleveland Winnipeg Montreal London



Inside or Out!

No Half-Way Business About It

Accident reduction in recent years has been chiefly among that class of cases known as the "boarding and alighting" kind. And more responsible for the improvement than any other single thing, has been the enclosed platform where doors and steps are interlocked with starting signals or control. This means that when the car is started there are no passengers left in dangerous positions, half way on or off the car.

National Pneumatic Devices have consistently lead the way and filled the bill in this development. They are widely used because on purely economic ground alone they save their cost in damage claims.

NATIONAL PNEUMATIC

Door and Step Control Motorman's Signal Lights

Door and Step Operating Mechanism
ghts Safety Interlocking Door Control
Multiple Unit Door Control

Manufactured in Canada by

Dominion Wheel & Foundries, Ltd.

Toronto, Ont.

National Pneumatic Company, Inc.

Originator and Manufacturer

50 Church St., New York

McCormick Bldg., Chicago

Works: Rahway, N. J.

STOP

PROCEED

Н

SEMAPHOR.E PROCEED STOP PROCEED

FOR DOUBLE TRACK Interurban Railways

Union automatic

block signals

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.



On the W. B. & A. Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

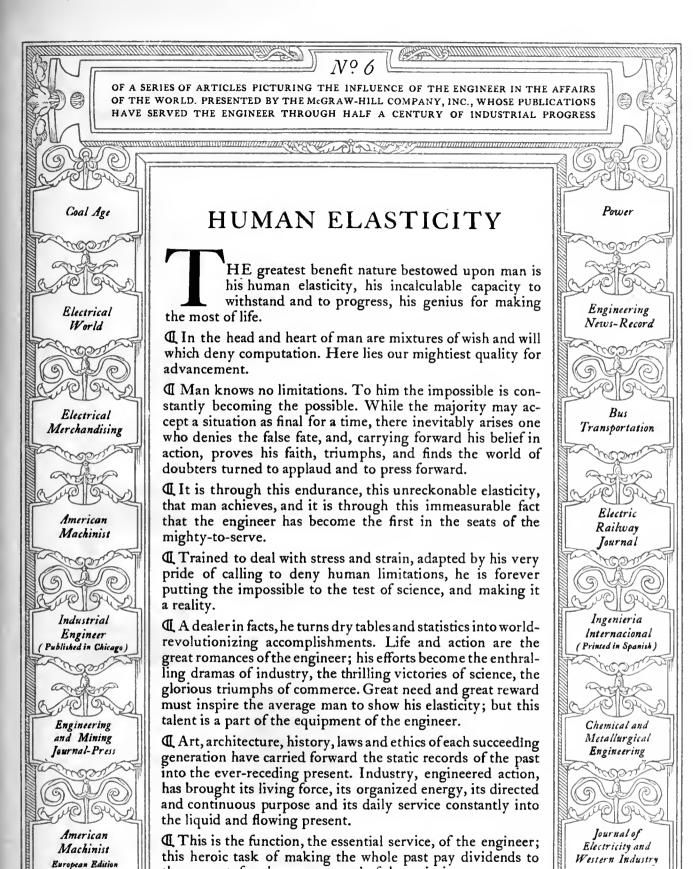
Let us study your operating conditions and cooperate with you in considering what automatic block signaling will do for your line.



Union Switch & Signal Co.

SWISSVALE PA





McGRAW-HILL COMPANY · INC ·

(San Francisco)

the present, for the greater good of the majority.

(London)

NEW YORK



The First Electrochemist

ing to the science of a century ago, was "the principle of contagion when respired by animals in the minutest quantities." Mere say-so.

Imaginative yet skeptical Humphrey Davy, who believed in experiment rather than in opinion, "respired" it and lived.

It was this restless desire to test beliefs that made him one of the founders of modern science. Electricity was a new force a century ago. Davy used it to decompose potash, soda, and lime into potassium, sodium, and calcium, thus laying the foundations of electrochemistry. With a battery of two thousand plates he produced the first electric arc—harbinger of modern electric illumination and of the electric furnace.

Czar Alexander I and Napoleon met on a raft to sign the Treaty of Tilsit while Davy was revealing the effects of electricity on matter. "What is Europe?" said Alexander. "We are Europe."

The treaty was at that time an important political event, framed by two selfish monarchs for the sole purpose of furthering their personal interests. Contrast with it the unselfish efforts of Sir Humphrey Davy. His brilliant work has resulted in scores of practical applications of electrolysis in industry and a wealth of chemical knowledge that benefited not himself but the entire world.

In the Research Laboratories of the General Electric Company, for instance, much has been done to improve the electric furnace (a development of Davy's arc) and new compounds have been electrochemically produced, which make it easier to cast high-conductivity copper, to manufacture special tool steels, and to produce carbides for better arc lamps.







Which one is

Most Attractive—Most Economical

Both viaducts in the same city—one with separate lighting and railway poles, the other with Elreco Combination Poles,

This is a mild case compared with the streets of many cities where rows and rows of clumsy wooden poles stand as monuments to lack of co-operation, lack of civic pride and lack of even the first principles of efficiency.

Start a movement in your city to beautify and at the same time economize, by installing Elreco Combination Railway and Lighting Poles. Over seventy other cities now are using them. Send for illustrated catalogue.

Electric Railway Equipment Co.

Cincinnati, Ohio New York City, 30 Church Street

ELRECO POLES

POINTING TO DO



Protects the Public—and Your Revenue

When cars are delayed — people walk. Every blockade due to line breaks means a loss of revenue and creates a public menace.

What makes it worse, is the fact that line breaks nearly always occur at the points of heaviest traffic—at downtown curves and crossings. Revenue losses incurred are correspondingly heavy—and the danger greater because of crowded streets. Sound business judgment as well as good engineering dictates the use of *PHONO-ELECTRIC* trolley wire at all such points.



The loss of revenue from one serious blockade alone would more than pay the difference between the cost of *PHONO-ELECTRIC* and that of inferior wire.

Bridgeport Brass Company Bridgeport Connecticut

UBLE ECONOMY



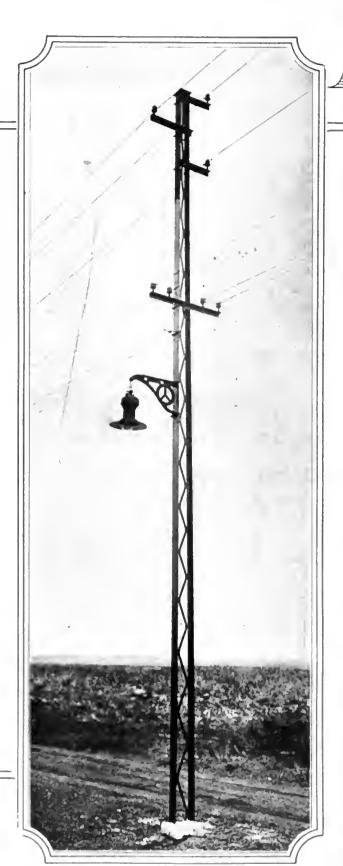
Diedictric Electric

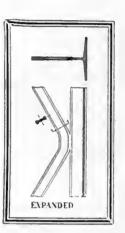
Effects a Direct Saving In Ultimate Cost

—not only through the prevention of line breaks and elimination of consequent revenue losses and the danger of fallen wires—but by effecting direct economy in the ultimate intrinsic cost of your trolley wire itself. Because *PHONO-ELECTRIC* will give years of service long after ordinary trolley wire would require replacement. Innumerable practical instances taken from the actual records of *PHONO-ELECTRIC* trolley wire in the hardest sort of service proves *PHONO-ELECTRIC* to be almost impervious to wear.

First used as an experiment in electric trolley service nearly twenty-five years ago, *PHONO-ELECTRIC* is today standard equipment on the highest class properties.

Bridgeport Brass Company Bridgeport Connecticut





Bates Joint

This diagram illustrates graphically the superiority of Bates One Piece Steel Poles.

Notice the strength features of the Bates Joint. The juncture of flange and lacing is not a joint, strictly speaking, for this is the original unsheared metal, without rivets or welds.

The full strength of the steel is utilized in this smooth one piece construction. This means not only maximum strength but leaves all surfaces easily accessible for painting. Periodic painting at a moderate expense absolutely prevents rust, making Bates Poles practically everlasting.

The exclusive method of manufacture of Bates Poles, besides giving maximum strength, also tests the material during manufacture. Any flaws show up in the expanding process and the pole is discarded.

In spite of these advantages of one piece pole construction Bates Poles actually cost less than equivalent poles, of any other type.

District Sales Offices

Boaton: 628 Old South Bldg. Rochester: 119 Main Street, East Syracuse: City Bank Bldg Buffalo: 601 Ellicott Square Philadelphia: 1333 Heal Estate Trust Bldg Pittaburgh: 305 Union Areade Bldg Columbus: Joyce Realty Bldg, Indianapolis: 518 Traction Terminal Bldg.

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EXPANDED Steel Poles

for Combination Trolley and Lighting Use



The superior strength of Bates Poles, their longer life, good appearance, and lower maintenance cost would justify a higher first cost, a greater price per pole for Bates than for other types of poles.

But, present prices of Bates Steel Poles are approximately the cost of equivalent wood poles! (And, of course, less than the cost of other types of steel poles.)

Pole lines using Bates Steel Poles are the most permanent construction known, and today such a line costs less per pole, much less per mile, than even an equivalent wood pole line. Bates Poles are sound and stanch in storms, impervious to lightning destruction, require fewer insulators and other fittings, last a generation beyond the life of wood poles.



208 South La Salle Street, Chicago, Illinois





CHICAGO **ORDERS**

more than

3,000

ECONOMY METERS

With Car Inspection Dials

ECONOMY Meter with Power-Saving

Economy Power-Saving Railway Meters, by recording the kilowatt-hours consumed, show both the motorman and the management the individual "power bills." Thus they get down to the very fundamentals of energy checking and saving. In addition individual car energy records afford data of high engineering value and a convenient basis on In addition individual car energy records afford which to inspect car equipment.

and Car Inspection Dials

HIS notable purchase follows a thorough investigation of powersaving devices. Every one of the more than 3,000 cars operated by the Chicago Surface Lines will be equipped with an Economy Meter with Power-Saving and Car Inspection dials.

There's a Nation-wide Interest In Power Saving

During 1922 large and small properties in all sections of the country joined this nation-wide Economy Power Saving Campaign.

Such properties as the Chicago Surface Lines; Philadelphia Rapid Transit Company; United Railways of St. Louis; Eastern Massachusetts Street Railway Company; The Milwaukee Elec. Ry. & Lt. Co.; Louisville Railway Co.; Cincinnati Traction Co.; San D'ego Electric Ry.; West Penn Railways; Illinois Traction System and the Union Traction of Indiana and more than 100 other properties have standardized on Economy Meters to save power at the car and labor at the car house.

The Economy Meter is a simple, rugged, energy-measuring device designed particularily for car energy saving. The records are of high value for managerial and engineering purposes.

ECONOMY ELECTRIC DEVICES CO.,

L. E. GOULD, PRES.

DISTRICT REPRESENTATIVES:

National Railway Appliance Co., New York L. A. Nott, San Francisco Burto Graysoo Railway Supply Co., St. Louis Detroit Railway Supply Co. Burton R. Stare Co., Seattle Ludwig Hommel & Co., Pittaburgh ply Co. Alfred Collyer & Co., Montreal, Quebec Cable address: Sangamo, Chicago





REPEAT ORDERS

are now being placed for

ALUMINUM FIELD COILS

Aluminum field coils passed through the experimental stage some fifteen years ago - in Europe.

Since they have been developed and manu-

factured in America more than sixty railway properties have successfully used them.

There is every conceivable advantage in using aluminum field coils on direct current motors. Consider these qualities—

Longer Life—Same Field Strength Less Weight—Less Terminal Trouble Quicker Conduction of Heat—Less Affected by Moisture

The Aluminum oxide insulation is an integral part of the conductor and since there is no cotton insulation to char or bake out internal shorts are practically eliminated.

Lind Aluminum field coils are doubly protected against external failures—after being dipped in an insulating varnish and baked they are wrapped with webbing, Micanite, oiled bias tape and again with webbing-they are then dipped and baked once more in insulating varnish. They closely resemble copper coils—same dimensions, contour and terminals.

If you haven't tried Lind Aluminum field coils send in an order for a set—there's even a price advantage for many types.

Illustrated Bulletin sent on request.

Old Colony Building, Chicago, Illinois

Sangamo Economy Railway Meter

(General Sales Agents)

Lind Aluminum Field Coils

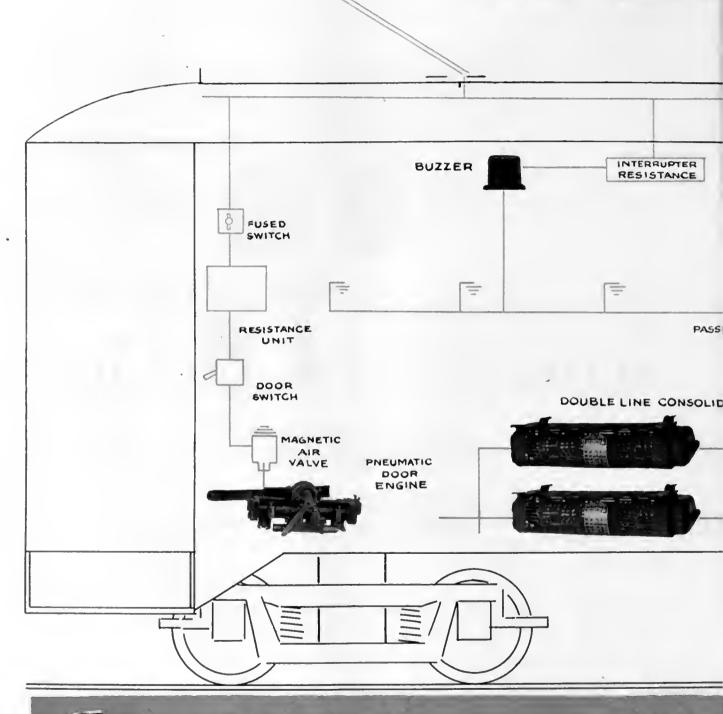
Peter Smith Heaters Woods Fare Boxes .

District Agents for

Bemis Boyerized Truck Specialties

Consolidated

Heating, Signaling

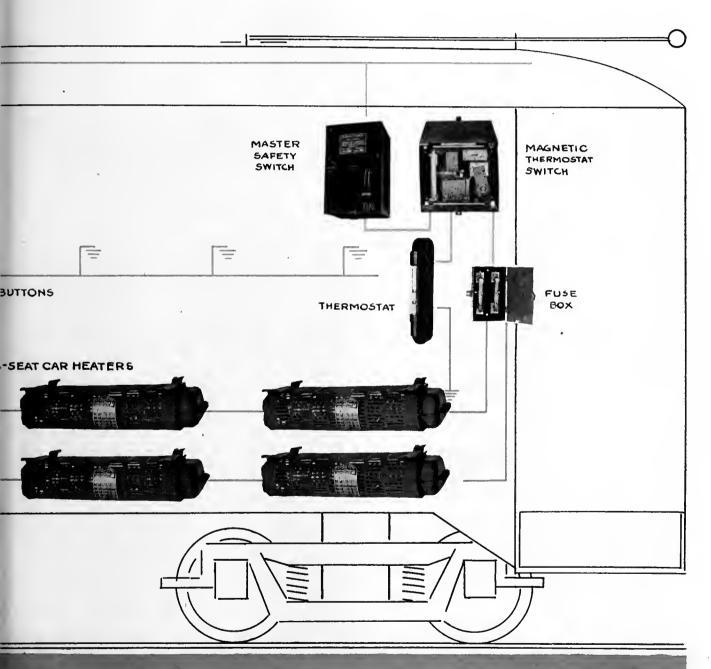




Consolidated Car NEW YORK, N.Y.

ALBANY,

Equipment and Door Operating!



Heating Company CHICAGO, ILL.





United States Electric Signals

Adaptable to any operating conditions

Do not say your conditions are so different that you cannot apply a standard signal and get the results you want. United States Electric Signals are being used so widely and in so many novel as well as standard ways throughout this country and abroad, that we can say with entire confidence—no matter what your local conditions are, we can show you how to use United States Electric Signals to permit increased frequency and volume of service, at higher speeds, and with greater safety.

Others are doing it. One large system alone has over six hundred installations in almost every conceivable situation. Used at passing tracks, wyes, branch-offs, used as spacing signals on high speed double track lines where the view is obstructed, and on double track where reconstruction work temporarily requires single track operation. In the latter case, substantial savings are effected by the elimination of flagmen at switches.

United States Electric Signals will meet your conditions. Let us figure on an installation now.

Write for full information



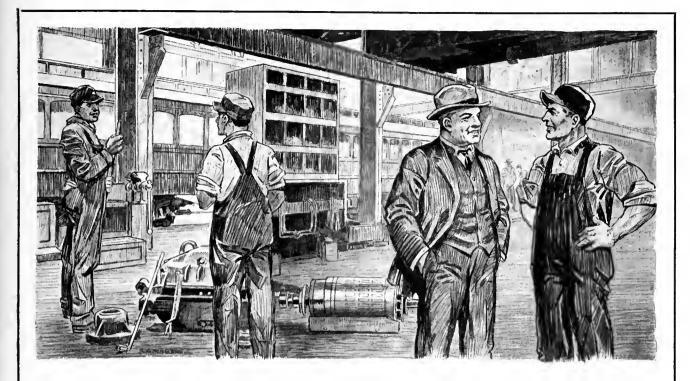
United States Electric Signal Company

West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadonck Illdg., San Francisco Foreign: Forest City Electric Services Supply Co., Salford, England





What's up now Jimmy?

The boss sure had me guessin this morning when I told him these Helical Gears and Pinions were wearing smooth, and even all over the face of the teeth. Well, he said, the wear will show up when you try to put a new pinion with a worn gear, and I thought sure he was right, but he said try it out, if there is going to be trouble when we have to change, we want to know it, so I put in a new pinion and the Motorman said he didn't know it had been changed. When I reported to the boss that they meshed and worked perfectly, he said, well that settles it, we will standardize on Helical Gears and Pinions. Nuttall has proven out.



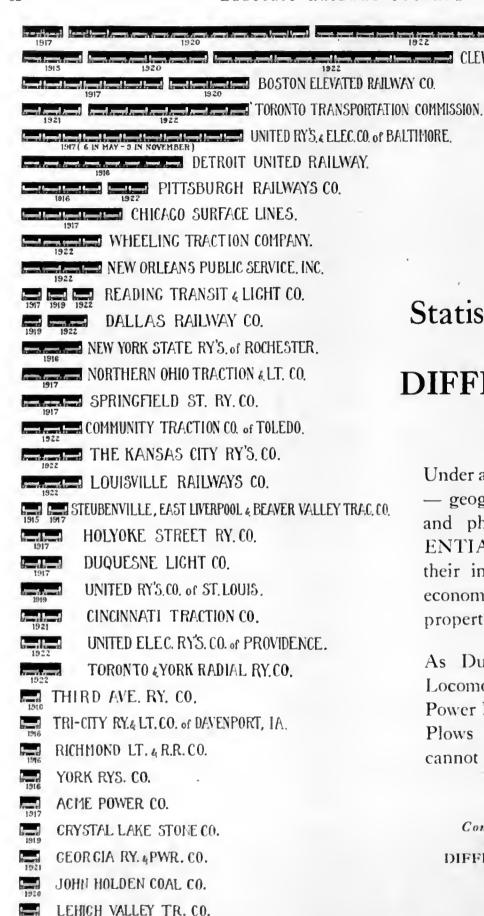
RDNUTTALL COMPANY PENNSYLVANIA

All Westinghouse Electric and Mig. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

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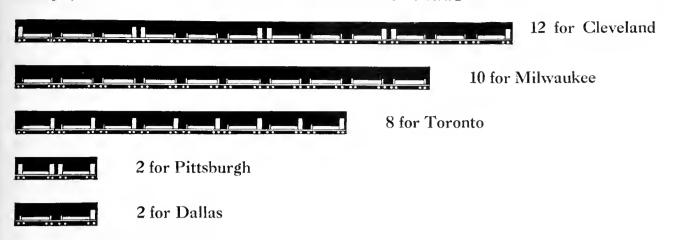
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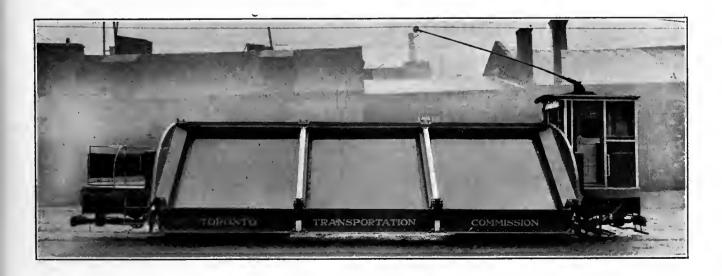


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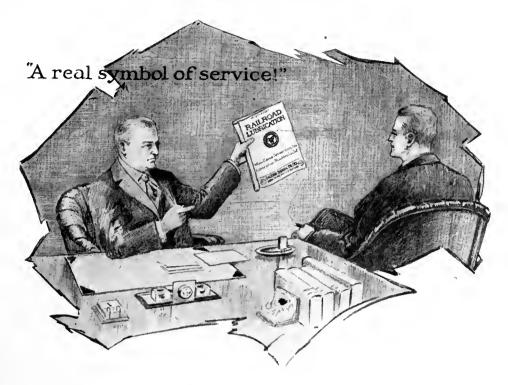
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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

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Number 1

New Features of the Annual Statistical Number

THIS issue of the JOURNAL, the Annual Statistical and Progress Number, contains several new features in connection with the statistical studies. One entirely new compilation has been made to develop the figure representing what the industry will expend for new plant and equipment in 1923, with the similar figure for 1922 for sake of comparison. In the study to show the rolling stock purchases of the year, the information was compiled in more detail than heretofore to show the trend in the utilization of one-man cars in both city and interurban service and the extent to which trailers are coming into use. The cars purchased for train operation in rapid transit service have been segregated this year for the first time. Also the number of cars modernized by remodeling is given. For the first time, the purchases of automotive equipment by the railways were compiled and listed as to type—truck, bus and trolley bus. A new column has been added to the table of total trackage and total cars owned for the entire industry to show the number of buses owned by electric railways. Track abandonments are divided between city and interurban.

Aside from the statistical studies, another new feature appears in the form of an electric railway engineering review in which are recorded the notable achievements of the year. This review will serve to give specialists in the several branches of the engineering work a summary of the important developments going on in other phases than their own.

Prosperity Is Returning to Electric Railways

JUST as the curtailment of expenditures by the electric railways in the past few years has been a direct reflection of their financial difficulties, the very large expenditures during 1922 show the rapidly returning prosperity of the industry taken as a whole. statistics compiled by this paper and detailed elsewhere in this issue present a heartening confirmation of the generalizations that have been made about the improv-In every branch of the statistical ing conditions. studies is the greatly improved financial condition evi-During 1922 the electric railways built and rebuilt 960 miles of track-more than in any year since before the war. New cars to the number of 3,538 were purchased, which is nearly three times as many as in 1921 and practically the equal of any year since In addition, very large sums of money were spent in rebuilding 1,579 cars.

The number of receiverships occurring during 1922 (fourteen) is the smallest in any year since 1909, except for 1910, when eleven roads failed, and 1914, when the number was ten. Furthermore, increased

earnings enabled six companies to lift themselves out of receivership during 1922, and there is very good prospect of several other large companies being able to do this early in 1923.

These few figures provide justification for the statement that the railway industry is greatly improving its position and in a fundamental way. The new cars ordered and the large number of cars rebuilt show how the railways are wisely endeavoring to modernize their service, while conserving the value in the best of the older cars by reconstruction to conform to the development in the art, and particularly to take advantage of the growing use of one-man operation and thus bring down operating costs. While the mileage of new track added to the electric rail systems has been small, the very large amounts of money that have been put back into the properties in rebuilding 740 miles of track represent an exceedingly important pursuit in re-establishing the railways' financial standing and insuring the continuance of their position of first importance in providing local transportation.

Furthermore, the indications are that the betterment process of existing rail systems will go on at an even greater rate, measured in expenditures for new plant and equipment, during 1923. The expenditures in this direction to be made during the year would appear, from the data compiled by the JOURNAL, to amount to probably 60 per cent more than for 1922.

Car Design Tending Toward Lightness and One-Man Operation with Larger Units

ROLLING STOCK purchases constitute an excellent barometer of the volume of electric railway business. New cars ordered this year have reached the levels of pre-war days and reflect the progress that electric railways have made toward reconstructing their properties and increasing their service. figures for 1922 are especially encouraging because of the increased number of railways which ordered new cars. The total number of companies reporting new rolling stock this year is about 50 per cent more than last year. Another point of encouragement comes from the fact that while car orders for the first six months of 1922 were greater than for the whole year of 1921, there were more than twice as many cars ordered during the last half of the year. Manufacturers of railway equipment can thus look forward to a still more prosperous year for 1923. There is no doubt that the purchasing power of the electric railways is being restored and should increase during the coming year.

Previous to 1914 the electric railways of this country were ordering from four to six thousand cars a year. The number dropped to 3,000 in 1914, and since then this number has been exceeded but twice. Once was in

1916 with a total of 3,942 and again in 1920 with 3,598 new cars. The total of new cars and locomotives for 1922 again exceeds the 1914 figures.

The number of ears purchased this year which can be properly classified as safety ears is greater than for 1921, but when compared with the total number of cars ordered the percentage took a considerable drop. In fact the ratio of the number of safety cars ordered to the total cars purchased for city service has been decreasing since 1919. This, however, does not mean a decrease in one-man operation, for in addition to the new cars purchased many old cars have been reconstructed for one-man operation. One-man operation of large cars took a decided jump in 1922 and for the first time orders have been placed for new double-truck one-man cars, and the interurban field has also been opened up to one-man operation.

New designs of large double-truck cars with provision for operation by either one or two men form an interesting development. There appears to be a large field of usefulness for such cars in congested city service where one man cannot handle the peak period

loads without serious delays.

Light weight has been a particular feature of car design this year and in fact for several years past. While the statistics show that electric railways are done turning to more extended use of large cars, still the light-weight feature and one-man operation which were introduced through safety car design are advantages that are being continued with large economies. An analysis of eight types of light-weight double-truck cars that were bought this year shows a weight per passenger seat ranging from 513 lb. to 676 lb. with an average of 600 lb. This is 100 lb. per passenger seat heavier than the average single-truck safety car, but still is considerably less than that for the usual double-truck cars of previous years.

There are three outstanding features shown by a study of the rolling stock statistics. First, operation of ears by one man is increasing rapidly and a conservative estimate shows that 10 per cent of all motor passenger ears now used have provision for one-man operation. Second, there is a decided tendency toward the use of larger cars than the single-truck one-man car. Third, light weight in car construction is receiving particular attention.

Real Engineering Is the Hope of the Future

SEVERAL pages of this issue are devoted to a discussion of the accomplishments of electric railway engineers, particularly in 1922, and the prospects for 1923 and beyond. This is based, in part, on the suggestions of a large number of engineers who were asked to devote a little "concentrated thinking" to the subject. Many of them did so, with the result that it has been possible to evoke a fairly complete record of the high spots in recent achievement and immediate probability.

There is one development, however, that the review does not reflect, and that is the picture of the engineer himself which shines out through what he says about his work. In this picture he appears as one who is interested in engineering only as a means to an end. His object is to further the cause of transportation service, and good engineering to him means only that which will produce the most and best transportation

within the financial limitations imposed by conditions over which he has little control. The railways are in as good condition as they enjoy today in large measure because their engineers have been on the job.

However, for fear that they may be too much "set up" by reflections like the above, a private word in the ear of the engineers will not be taken amiss. As attention is directed more to the broad objects of engineering, rather than to detail, there is danger that interest in, and working knowledge of, its fundamentals will suffer. Criticism is heard to the effect that utility engineers are becoming superficial. They are probably not more so than men in other departments, but their work is of such character that any lack of fundamental knowledge which they may possess is very conspicuous. The only antidote to this is study. Engineering is moving on; one cannot live on the mental accomplishments of the past. A good slogan for 1923 is the interrogation point; either real reasons should be found to justify existing practice or this should be so changed that it can be defended.

Governor Smith Recommends Municipal Ownership

*OVERNOR SMITH'S recommendations to the New J York State Legislature on transit matters, as given by him on Jan. 3, are bound to create a tremendous amount of discussion both within and without the state. While they were foreshadowed to a large extent by his platform and pre-election statements, they appear very definite and concrete when made part of recommendations to the Legislature for action. Briefly, Governor Smith declares: (1) For city instead of state control of purely local utilities where that policy is preferred by any city, (2) that municipalities should be permitted to purchase, build, own or operate utilities where they determine this to be in their best interest, and (3) that, as far as transit is concerned, the cities should be free to adopt any form of conveyance found suitable to their needs, whether railroads or omnibuses.

The advisability of each of these recommendations is open to serious doubt. In the case of state versus local regulation, New York was one of the earliest states to introduce the modern state regulatory commission plan, and it has worked well, in spite of the fact that there has been an unfortunately large number of changes in commission personnel with each change of state administration. To change now from state to city direction will be a backward step. The suggestion about buses is proper if coupled with the proviso that all means of transportation should be co-ordinated, but buses run as competing jitneys will be worse for the transportation of New York City as a whole than if there were no buses at all.

Finally, the recommendation in favor of municipal ownership sounds strange when coming from the Governor of New York State, within whose confines the largest financial, commercial and fiduciary organizations in the country have their homes. Many of these, as well as many citizens of New York State, are largely interested in utility enterprises in all parts of the country, and they will hardly look with enthusiasm upon the adoption by the Empire State of a policy which is likely to be inimical to utility investments without as well as within the State and opposed to economical utility administration. The nation had all the experience it needed during the war to learn that public direction of

business enterprise is bound to be inefficient and wasteful. Municipal operation under the conditions which prevail in our large cities is certain to be worse than if the power were exercised by state authorities.

Those citizens of New York State who realize the unfortunate effect of turning over the utilities in the cities of the state to a set of hungry politicians must take the responsibility of opposing the plan, if they do not wish to see it prevail. They cannot and ought not to assume that the utilities will do all the fighting. As for the various utilities themselves, they should unite in this matter, because the message makes no distinction except as regards extent of territory served. What may be of principal concern at this season to the railways may be followed later by a similar policy toward the power, gas, water and telephone companies.

Double-Track or Three-Track Elevated Structure Costs About a Million a Mile

As CITIES arrive at the point where they must have rapid transit they naturally turn first to elevated railway as the least expensive means for getting cars off the streets. There are many objectionable features in this form of railway, but they are not so great as in the early days of the lines in New York and Chicago, when puffing steam locomotives furnished the motive power. The advantages, however, outweigh the objections where traffic is sufficiently dense to support some kind of rapid transit, but not dense enough for a subway.

The recent publication in this paper of the results of a detailed study of the new Frankford Elevated Railway in Philadelphia suggests a comparison of its cost with that of other elevated lines. In trying to make such a comparison, however, one is confronted with almost insurmountable difficulties. The principal one is due to the tremendous fluctuations in costs of Another follows from the radical differmaterials. ences in design details. In each case, also, there are many items which must be at least in part eliminated for purposes of comparison. In Boston, for example, the total cost of the 9 miles of elevated railway, as of Dec. 31, 1921 (not including power plant and rolling stock), was \$19,529,000. But this total includes nearly \$10,000,000 for right-of-way and other land and for right-of-way damage. The item of stations, waiting rooms and other buildings, also, is a large one, \$2,384,000. With cost items not chargeable to the elevated structure, track and incidentals eliminated, the cost figures out about a million dollars per mile.

This checks fairly well with some of the recent Interborough Rapid Transit elevated construction in New York City. The three-track 1.7-mile elevated railroad on Webster Avenue and Gun Hill Road, for which bids were received in 1915 and construction completed Dec. 13, 1920, cost, with three stations but exclusive of rolling stock, \$1,000,000 per mile of structure. Section 1, Jerome Avenue line, three-track, for which bids were received in 1913, cost, exclusive of rolling stock and electrical equipment, \$820,000 per mile. The two-track Livonia Avenue line in Brooklyn, for which bids were received in 1915, cost \$990,000 per mile.

In considering the cost of the Frankford line it must be remembered that this was built with certain specifications which made construction more expensive than would have been strictly necessary if the designers had had a free hand. There are compensations, however, for most of the extra expense, which cannot well be evaluated in dollars. For example, the support of the structure from the ends of the transverse girders required more steel than would have been necessary with the columns directly or nearly under the track This, however, eliminates obstructions to traffic in the streets. The center-column construction in Frankford was special and involved expensive foundations. At the same time it keeps the sidewalks clear of obstructions, which was what the Frankford property owners insisted upon. The concrete deck, stipulated by City Councils, was a costly construction, but it eliminates drip from overhead and provides a quiet track. The maintaining of a separate entity of the city-owned property was also a complication in Philadelphia, but was considered necessary to permit independent operation if suitable operating contracts with the P.R.T. proved not to be feasible. All of these and other considerations affected the Philadelphia designs, coupled with the desire of the designers to minimize maintenance costs even at some additional expense in first cost.

Since the article was published, the revised cost data of this line, as of Dec. 1, have become available, tallying closely with the estimates given on page 843 of the issue for Nov. 25. Roughly the total cost of the Frankford "L" was \$15,500,000, or about \$2,100,000 per mile. This includes 100 steel cars (\$3,026,000), interest (\$1,253,677), which is a large item due to war-time and other delays; real estate for station buildings, etc. (\$726,999), three equipped substations (\$444,000), signal system (\$412,000), and sundry other items which are not properly a part of the elevated structure cost. Eliminating those parts of the cost which are not chargeable to the elevated structure and track, the cost figures out somewhat more than a million dollars a mile. It is higher than the other lines mentioned, but not more so than would be expected from the unusual construction. It is close enough to the other unit costs, however, to warrant classing it with the others and to permit a general statement that elevated lines of modern design cost about a million dollars a mile. Each job is, however, a special one and generalizations cannot be too sweeping.

Has M. Coué Any Lesson for the Electric Railway?

MILE COUE, the famous auto-suggestion expert of Nancy, France, has come to the United States for the purpose of spreading the gospel of "day by day, in every way, I'm getting better and better." His philosophy, if correctly comprehended, is that good health, physical and mental, is promoted by thinking health rather than disease, by fixing the thought on the goal desired rather than on the apparent obstacles in the way of attaining it.

But what has this to do with electric railways? Everything! Until recently, for several years, the electric railway industry has looked upon itself as ill, seriously ill. Undoubtedly it was ill, but too much introspection of the subject made the matter worse. Now is the time to apply the Coué principle. Let the thoughts of railway managers turn primarily from remembering how sick the industry has been to the subject of service. They have talked service increasingly and, to a corresponding degree, tried to give it, but there is a need to go further. Concentration on the idea of service should

be so complete that the better health of the industry will result as a matter of course.

To be sure, there is only a limited parallel between the human organism and a national industry. The human body constantly tends toward health if given half a chance. This can hardly be said of the electric railway, but there is no doubt that if the slogan is: "Day by day, in every way, our service is being made better and better," and if this is the ambition of every one in the organization, the industrial conditions of the company will improve also.

A Pertinent Request Regarding Employee Training

THE educational committee of the American Association, of which Edward Dana, general manager Boston Elevated Railway, is chairman, has just issued a call for co-operation in its work. The request is made for a simple and perfectly definite thing to be done, namely, the appointment of some man on each property who will specialize on the employee-training problem of his own company. This is not necessarily a whole-time proposition, but it is a vital-interest proposition; that is to say, the appointee should be some one who has shown by his deeds and words that he believes in education in the broad sense.

It ought not to be difficult to find a man on each property to "fill the bill" in this case. In fact, a live property without at least one enthusiast for vocational and higher training is inconceivable. The main thing is to get him started to doing something definite. The idea of being one of a large group of specialists in this field should make a strong appeal.

The committee proposes a definite service, not according to any ready-made or preconceived program, but according to the needs of the individual property. This is a great deal to offer. A prompt response will show that the offer is appreciated.

Paramount Advantage of Electrification Is Improved Transportation

Two or three electrifications of note were decided on during 1922, but progress in this line fell short of showing the concrete results that were anticipated early in the year. Fortunately, however, there has been some advance in the industry in trying to improve the method of approach to the problem of electrification and of presentation to railroad executives. This augurs well for the future. And it indicates that the electrical industry has come to realize that part of the blame for the slow advance in electrification may properly be laid at its door.

Until the transportation advantages of electrification and the unquestioned success of every existing installation can be made clear in discussions of the subject, electrification progress is bound to be slower than it should be. Railway executives are not interested in details of the equipment. What they want to know is that the system works, that it will improve the transportation efficiency of their properties and that it will pay. On these points, the electrical industry can satisfy them and should proceed to do so.

But this does not mean any stoppage of work or discussion, properly conducted, in connection with advance in engineering development. If anything, it should be a spur in several ways. For one thing, there is opportunity to realize even greater dependability of service and an approach to engineering perfection in the product. Again, while the advantages of all systems of electrification so far applied may be recognized, their relative advantages are of far less importance than the need of fitting electrification to the job, and engineers should work toward the best answer for the case at hand rather than carry their debates into the open and cause the failure of the entire plan. That there are concrete signs of a willingness to approach future electrifications in this manner is most gratifying.

It is not inconceivable that electric railway engineers may soon arrive at some solution which will involve the admitted advantages of alternating-current distribution and at the same time the good points of the direct-current motor equipment. The problem is being attacked from several angles today, and if it is ever satisfactorily solved it will do more to advance the cause of electrification than any other one thing. Meanwhile, a better functioning of consulting engineers and a proper viewpoint of manufacturers' engineers and commercial men with reference to putting the advantages of electrification ahead of the satisfaction of having their own individual ideas win ont will do much to advance the whole program. One great advantage of more electrifications, no matter what their kind, is the opportunity they will provide for further knowledge and therefore advancement toward perfection.

Equipment Department Rehabilitation Will Be Especially Active This Year

THE estimates of expenditures made during 1922 and to be made during 1923, which appear in an article elsewhere in this issue, give considerable material for study. It will be noted that the largest increase in expenditures will be for equipment. A vast sum will nevertheless be spent on the track, but considering the relative investment in track and rolling stock, the equipment department will lead in activity. There will be a big development, too, in the power end of the electric railway properties.

There probably will be more than one explanation of the changes in the relative estimated expenditures tabulated at the end of the article mentioned. Here are some of the circumstances, however, that affect them. During the war period track was allowed to run down proportionately more than the other parts of the railway plant. This point is touched upon in the article by Frank R. Coates, also printed in this issue. As he states, cars had to be kept up and, while he did not mention the fact, power had to be kept on the line. The track, being inert and of slow deterioration, naturally took the brunt of the cuts in expenses. However, the track became so bad, in many cases, that it had to be brought up to condition, and the first money available for the railways had to be spent in that direction. This has been going on during the last two years and has involved very large expenditures.

Now the companies have largely eaught up with their deferred maintenance of track, although the track is by no means yet up to par. This year it appears from the table to be the turn of equipment, and the companies are planning to improve cars, shops, etc., on a large scale. In the power department, also, the automatic substation, new power house machinery and line and other equipment will come in for some real attention.







J. N. Shannahan



F. R. Coates



W. H. Sawyer

The Four Vice-Presidents Give Their Views

They Sum Up the Principal Accomplishments of Last Year, Draw Lessons from These Experiences and Point to What They Consider Are the Most Important Issues Before the Industry for Solution in 1923

Railway Association have kindly consented to give to readers of this paper their personal views on the electric railway situation. Each was asked to say what in his opinion were the outstanding accomplishments of 1922 and what are the most important question or questions before the industry today and his thought on how these questions should be answered. These statements, taken with the extended interview with President C. D. Emmons, published in the issue of this paper for Dec. 2, give the thinking of the five executive officers of the American Electric Railway Association. This may be said to represent the best thought on the various subjects considered.

What of 1923?

By Britton I. Budd

President Chicago Elevated Railroads and Chicago, North Shore & Milwaukee Railroad First Vice-President American Electric Railway Association

We Should Bend Every Effort Toward Modernizing—
If Railways Show Eagerness for Improvement in
Methods, the Manufacturers Will Be Stimulated in
Research and Development Work

Much has been accomplished in the last three or four years in the way of meeting and overcoming some of the difficulties with which our industry was long confronted. The World War and its aftermath of inflated prices brought about a crisis in the electric railway industry that imperiled its very existence. Concerted action became imperative if the industry was to be saved from utter ruin, and, while that action was taken rather late to save some companies, the industry as a whole is to be congratulated on the results.

One lesson of vital importance was brought home to the industry during the crucial period, a lesson which we should not forget. That lesson was the value of publicity, of informing the public on our needs and taking our customers into our confidence to a greater extent than we had done in the past. The work of the Committee of One Hundred did much to clear the atmosphere and remove the clouds of suspicion which hung over the industry. It resulted in a general improvement of our public relations, and of a restoration, in some degree at least, of confidence on the part of investors in the soundness and stability of the electric railway industry.

This work must not only be continued but should be intensified in the coming year. We must have nation-wide publicity. State committees on public utility information, such as now exist in Illinois and a number of other states, should be organized in every state, to keep constantly before the public what we are doing. It has been shown conclusively that the press is eager for facts concerning the service and operation of public utilities, when such news is presented in an interesting way. We should in addition to this publicity make larger appropriations for advertising. We have something to sell and we should adopt up-to-date merchandising methods and the liberal use of advertising space if we are to be successful salesmen.

The importance of educating our own employees on our individual problems and business affairs has been fully demonstrated and we should in the coming year give even more attention to this phase of our business than we have done in the past. In this day of public regulation we have nothing to conceal, so that our employees should be kept fully informed on the financial affairs of the company for which they work. Our contact with our customers is through our employees, and if they are well informed on conditions, they are in a position to remove much misunderstanding and improve our public relations.

Determined efforts should be made in the year 1923 to give better service by increasing speed and comfort wherever possible. The standard of transportation has undergone a marked change in the public mind and

we should endeavor to modernize our operation to conform with this changed standard.

Most of our companies could well afford to send a number of their employees, selected from the supervisory forces, on a tour of inspection through various parts of the country, to gather information on modern developments and to learn what other companies are doing. The cost of such inspection trips would be returned in economies resulting from the increased knowledge and broader vision of the men in charge of operation.

There is always a danger of our becoming too selfcentered and satisfied with ourselves. We are too apt to think that because we have done things in a certain way for years, that way is the best in which they can be done. First-hand study of what others are doing, both inside and outside our industry, is an excellent antidote for self-complacency.

If our companies will show an eagerness for improvement in methods, it will stimulate manufacturers in research and development work and enable them to supply us with better equipment and apparatus. Many companies in our industry are handicapped by obsolete and uneconomical apparatus. So far as it is possible liberal expenditures should be made to replace worn-out and obsolete tools and equipment with the most modern on the market. We would not think today of using soft tool steel, such as we used 20 years ago, because we know that the present tool steel does the work with much greater economy. Yet that is exactly what we are doing, in many cases, with our car equipment. Liberal expenditures for equipment will enable manufacturers to spend more money on development, which has been at a standstill, and the industry as a whole will be greatly benefited thereby.

The message for 1923, as I see it, is to bend every effort toward modernizing our service. This applies to our merchandising methods through advertising, our business and office methods, our shop and track work and everything else that goes to make an effective, successful, modern business organization. By adopting such methods we can best serve the interests of the public, the employees and the investors.

The Bus as a Common Carrier

By John N. Shannahan

President Newport News & Hampton Railway, Gas & Electric Co. Second Vice-President American Electric Railway Association

It Should Be So Recognized for the Well-Being of the Public, the Existing Transportation Companies and the Bus Owners Themselves

THE bus question is the most important one before the electric railway industry at the present time. The bus is a common carrier, and should be subject to adequate state regulation such as is in force in practically all the states for the other public utilities. Such regulation is essential for the well-being of the public, the existing transportation companies, and even of the bus owners themselves.

It may be argued that the same reasons for regulation do not apply to a bus company as the other utilities mentioned. From their nature gas, telephone, electric light, electric railway and water companies have almost necessarily to be monopolies. In each case a very large investment in plant and equipment is re-

quired per customer served, and when once in place much of this equipment can be removed only with great loss. This means that the state must grant to such a utility a practical monopoly to encourage investment in and extension of the plant, and in turn to protect the public, it must exercise a control over the rates charged and the service given.

BUS GOVERNED BY SAME RULES

These conditions, it is urged, do not apply in the same degree to bus transportation. With a bus, the investment per customer served is small and if the profits from an enterprise are not sufficiently attractive the equipment can be readily removed to another point. Hence, it is claimed by some, competition is the best means for protecting the public against extortionate rates and insuring good service.

This, however, is a narrow view to take of the situation. It disregards entirely several important essentials of good transportation. Service, as understood by electric railway companies, is not simply the operation of cars on some profitable route, but means transportation where it is needed in an entire community. Such a service cannot be insured by competition. It implies not only cars on some unprofitable routes but cars at unprofitable hours and often cars at unprofitably short headways.

Equally important with these aspects of transportation is reliability of both the service and the operator. Persons who have built residences along a bus or trolley route depending on the bus or car to carry them between their homes and places of business want to know that the line is going to continue in operation. Those having legitimate claims against such a company have also the right to know that these claims will be satisfied. No bus line should be permitted to operate without a certificate of convenience and necessity, and without giving some assurance to the franchise-giving authorities that the service will be maintained, at least for a specified period, and that the company will meet all just claims which may be brought against it.

Finally, regulation of electric railways and other public utilities came into force to some extent because of abuses in financing. It was considered, and properly, that in a quasi-public enterprise like a utility, both the operating and the capital accounts should be subject to supervision by the state to protect the investor. This same need in the case of bus companies is obvious.

The absence of proper regulation of bus companies in many states is responsible for a large part of the financing difficulties which certain railway companies are now experiencing, particularly in refunding maturing obligations. Capital is loath to participate in these undertakings until it knows that they will not be subject to the unrestricted competition of unregulated business.

RAILWAYS HAVE A DUTY TO PERFORM

Electric railway companies have a duty to perform in regard to buses, as well as rights to respect. If they object to competitors they should be prepared themselves to furnish transportation to sections in their territory which have sufficient population to warrant such service. If they are not willing to build a trolley line for this traffic, they should install a bus line. For this purpose, and particularly as a feeder, the trackless trolley seems the logical form of bus for an electric railway to install in most conditions.

Improve the Service—Reduce the Leaks

By Frank R. Coates

President Community Traction Company, Toledo, Ohlo Third Vice-President American Electric Railway Association

President of Railway Operating Under Service-at-Cost Plan Sees in This Scheme a Satisfactory Solution of Utility Difficulties and Advocates Development of the Personal Side of Operation

HE electric railway business is going to be better I in 1923 than it has been in recent years. I base this statement not so much upon the improving figures that are coming from the accounting department, but rather upon certain fundamental conditions which to me seem very encouraging. In the first place, industries are opening up and producing more traffic for the transportation companies. Further, the public is coming more and more to realize the necessity for electric railway transportation, in spite of the considerable development of the passenger bus and the phenomenal spread of the private automobile. The public is beginning to realize, as electric railway men have realized for a long time, that railways furnish the only means for handling people in large groups, in other words, for what has been aptly termed "mass transportation."

It is true that there are sparsely-settled districts which cannot support electric railways. Existing electric railways in these districts must be abandoned, and service in these and other such districts furnish an excellent opportunity for the motor bus. I see a very promising field here for the trolley bus.

Looking ahead, we railway managers are apt to wonder where the money is coming from for desired improvements and extensions, and refinancing of present securities. It seems to me that this money is coming fairly easily, for the reasons mentioned above, especially if the securities are sold in reasonably small denominations to the patrons of our service. When assured of a reasonable rate of return, our patrons will be willing to finance or to assist in financing their local utilities because they will realize that in so doing they are helping to give the community in which they live the service which they desire.

FIX UP THE TRACK FIRST

The place where we need to take hold most vigorously at the present time is in track rehabilitation. This needs to be done not only because our run-down track is increasing operating expenses, but because we need good track to help us promote good public relations.

It was perfectly natural during the war period to let the track run down, and we cannot blame ourselves for following the course marked out by necessity. We were not earning money enough to go around, and some expenditures were inevitable. Wages had, of course, to be paid, and we could not let the cars go to pieces. We felt, very properly I think, that the track maintenance could be reduced somewhat, although we realized that we should have to make up for lost time later. That time has come now. Track everywhere shows the effect of the necessary cost cutting. Now we need not only to bring the track back to proper condition, but we should at the same time take the opportunity to bring it up to present-day standards. We can charge to capital that part of the cost which represents actual improvement over the old track.

KEEPING AHEAD OF THE PROCESSION

I have mentioned the track because it is such a conspicuous part of the electric railway property and because it sadly needs rehabilitation. Now for some suggestions as to forward movements. The first one relates to the merchandising of transportation.

The efforts of the electric railways in the direction of selling their service are beginning to bear fruit. Look, for example, at the ways in which local attractions are being capitalized for the benefit of the public and at the same time for the stimulation of traffic. "Tell the people where to go" is a slogan which may well be kept in mind. In Philadelphia the rapid transit company is advertising Independence Hall, Carpenters' Hall, the art galleries, Horticultural Hall, William Penn House, etc., linking therewith the numbers of the routes by which these attractions can be reached. This company is also pushing the "trolley hike" idea with a view to stimulating long walks with a trolley ride home. In New York City the Interborough Rapid Transit Company is extolling the beauties of Central Park and other municipal investments, with good results as to riding.

The weekly pass is another merchandising "stunt" which has the merit that it encourages larger use of the cars. The advertising plan carried out in Tacoma recently, in connection with the inauguration of the weekly pass, is a good example of transportation merchandising.

In this matter of "Where to go" the railways are the best agency for advertising local attractions. They carry the people to the points of interest and they benefit most directly when the attractions are appreciated. Moreover, advertisements in the cars are seen by people who travel, and the latter are apt to accept with interest statements as to routes leading to places which they have always intended to visit. In other words, advertisements which give the people something that they are glad to know and that they feel sure will benefit them are good advertisements.

IF THE SERVICE IS WORTH ADVERTISING, ADVERTISE IT

Advertising of "Where to go" is only one good form of publicity. Advertising of the quality of the service is also good, if the service is good enough to warrant this. Take, for example, the successful efforts of that master of publicity methods, Britton I. Budd, in the way he has played up his North Shore line with wonderful results. His advertising has put the North Shore on the map.

A campaign to show the relative economy of automobile and rail transportation ought also to be effective with the thinking public. In some cities the electric railway companies are trying to get the people to see the economy of laying up their automobiles in winter and using our cars. I understand that publicity along this line has been effective.

Another thing we ought to do is to put on more rolling stock. More cars, in general, produce more business, although of course this can be carried too far. More cars and lighter cars go together, because we cannot afford to increase greatly the aggregate weight of our rolling stock. However, it is possible to go too far in this matter of lightness. Cars may be made so

light as to be difficult and expensive to maintain. The general principle, however, holds.

One more thing that we can do in merchandising our service is to speed it up. It is the speed of the automobile that constitutes its great appeal to the people. We must learn the lesson of getting more speed out of our cars. Co-operation with traffic officers will help in this connection and at the same time will help to eliminate causes of accidents. By advertising and in other ways, also, we can educate our patrons in promptness in boarding and alighting from cars.

ALONG WITH BETTER SERVICE MUST GO OPERATING ECONOMY

Good service, well sold, will please the public. But if the electric railways are to make a reasonable profit, they must introduce all sorts of economies. The place to begin is on the car platform. The operation of double-truck cars by one man is one of the most promising developments. I feel strongly that we must make every effort to get out of the "two-man" habit.

I realize that we cannot buy as many new light double-truck cars as we should like. We must make the best possible use of our old rolling stock until it wears out, because the total investment of the industry in cars is enormous. It must be amortized gradually.

When we are fortunate enough to get some new cars, we must handle them more carefully than we have been doing in the past. Our men must be taught the value of the property which is placed in their hands, and the extent to which they control the life of the cars.

ELIMINATING WASTE IS TRUE ECONOMY

A good slogan to use in connection with our efforts to operate economically is: "Stop the leaks." We find such leaks everywhere, one of the most serious being through the payment of accident claims. If accidents are caused through the neglect of our men, of course we must and ought to pay for them, but there ought not to be so many accidents. Co-operation with the men will reduce their number.

We need better inspection, too, in all parts of our properties. This should be done by departments, because workers in a given department are experts and they, better than outsiders, ought to be able to detect the places where leaks need stopping. Great care should be exercised in selecting inspectors—men who are alert, thorough and practical.

In recent years great progress has been made in the fitting of service to transportation requirements, both as to routes and schedules on those routes. Here, I believe, is still a great opportunity for economy. The giving of useless service is a leak which can be easily stopped.

I have mentioned several leaks of a real but rather intangible nature. There are many which are easier to detect and to stop. For example, the waste of lubricants is serious on most properties. We could all, also, give more careful attention to the bonding of the rails in our tracks, and to the condition of the overhead. Every scrap pile contains promise of effective efforts at reclamation, although here judgment must be exercised not to spend more in reclaiming material than it is worth.

All properties that are spending more to produce their own power than they can purchase it for are obviously permitting a big leak to continue. The labor in a large plant is so much less than is required in a

number of scattered small plants that in general the central station ought to be able to produce electrical energy more cheaply than can one operated exclusively for a railway, especially a small railway.

It seems to me that the people who use our cars are becoming more considerate in their thinking and treatment of our utility and other utilities. There was a time when it seemed as if a large number of communities would wish to take over their electric railways and try the experiment of municipal ownership and operation. The wave of interest in this matter is receding, as the public becomes better acquainted with the results of the experiments that have been made. Municipal ownership, in my opinion, is not the solution of the transportation problem, but it is rather in customer ownership. This might be called civic ownership; that is, ownership by the people as individuals, as opposed to municipal ownership—ownership by the people as a The difference here is largely in the community. elimination of politics and the development of good will and interest through a sense of personal ownership. This arrangement, to my mind, combines the advantages of public and private ownership and operation.

The "community traction" plan, as it is being operated in Toledo, is a step in the right direction. Here we have private operation with city supervision, and a large participation by the patrons in the financial results of operation. At the present time the service-at-cost plan in some form seems necessary, if the electric railways are to survive and, surviving, to give the service that the public demands.

The successful manager of today is one who is personally acquainted with his organization. All along the line the importance of the personal element must be stressed. The officials and department heads must travel with the men on the cars and become acquainted with them. They must frequent the recreation rooms and other places where men gather while waiting for their runs. They must get the men together for conference as often as circumstances warrant.

DEVELOPING ESPRIT DE CORPS IN THE ORGANIZATION

In Toledo we have an association of employees which performs an important function for us. Visitors to our property have remarked the enthusiasm and good-fellowship which seem to prevail. The personality of our chief, Henry L. Doherty, seems to permeate the organization, and all of his associates try to carry out his ideas of personal acquaintance. Our organization conducts educational work, welfare work and entertainment features. We have found affiliation with the national organizations of the utilities which we represent to be very effective. The good-fellowship fostered through our employees' organization is in evidence in their relations while on duty.

I am a strong believer in the value of frequent departmental meetings for the consideration of matters affecting operation. The suggestions of the actual operators of cars should be secured and acted upon after conference at these meetings. Attention should be paid to suggestions of minor officials and inspectors, and every effort should be made to let them know that their interest is appreciated.

In the foregoing remarks I have tried to give a basis for my optimism regarding the immediate future of the electric railway business and have endeavored to direct attention to means for increasing income and reducing expenses. To many progressive men these suggestions may seem trite, but there is no doubt that we can all make definite progress along the lines indicated. The first of the year is a good time to resolve to practice more completely some of the principles which we know to be sound.

Better Public Relations

By W. H. Sawyer

President East St. Louis & Suburban Railway, East St. Louis, Ill. Fourth Vice-President American Electric Railway Association

This Was the Outstanding Accomplishment of 1922 and It Is the Greatest Need for 1923—Handling of Bus Competition, Easier Financing and Most of Our Major Problems Depend on It

THE progress made in the appreciation of the mutual relations between public and company stands out as the greatest step forward in the affairs of the industry during the past year. The year 1922, particularly, has shown that the earlier endeavor in the matter of public relations is bearing fruit. Something very definite has really been accomplished, and it gives inspiration to renew the effort, for the importance of this matter is far greater than the discovery or development of any new type of car, however efficient.

Fundamentally, the industry is really in a more sound condition than it has been for ten years or more, because the circumstances which came along with the war have caused us to go to the bottom of our difficulties, and having determined them, to start cleaning out the cobwebs and the mushroom foundation and to supplant these with a foundation and structure that are solid in the light of public opinion. The strength of our situation is that we are now looking the facts squarely in the face and have started knowingly to pull ourselves out of our troubles. We are more sound than before the war because we know and have admitted our fallacies and, with that behind, are going ahead constructively. When one knows and admits his faults, it is not hard to work out the remedy. And with this as the goal there is every reason for optimism, for the cities cannot go on without the street railways.

The opportunity still exists, perhaps more than ever, to accomplish much through the medium of keeping the public informed and doing all that is possible to promote friendly relations. It can hardly be expected that we can undo in a day the results of an attitude that has been with us through several generations. But the accomplishments of the last five or six years have really begun to show the improvements that may be expected with the development of the understanding of mutuality of interests between public and railway.

The prosperity of local industry depends very much on the street railway. On the other hand, the prosperity of the street railway is assured, not only because of this improved understanding of the railway by the public, but due to the general abolition of a standard fare. If the street railways had now to face a uniform level of 5 cents or 10 cents as the rate of fare for the next five or twenty years, there could not be as great assurance in going after new capital as there can now with the understanding that fares must vary with cost. While I cannot enthuse over the strictly service-at-cost type of franchise, such a franchise is better than one carrying a fixed fare as one of the

terms. The fixed maximum return on the investment, which is usually a clause of the service-at-cost franchise, goes too far, for it takes away the incentive for high efficiency in operation.

We have not yet done our share as operating men fully to inform the public of the fact that future extensions of railway lines depend solely on our ability to get new money. There is not yet a full appreciation of the necessity that the railways shall earn a full return on the present money invested in their systems, so that investors may have the confidence to put more money into the property with reasonable prospect of a good return and repayment of the investment.

Incidentally, those investment bankers who have advertised that their utility securities do not include railway securities have unduly and unfairly hurt the railways and themselves. I do not believe any one ever gets anywhere by pushing some one else down. In my opinion street railway securities are a better investment today than they have been at any time in ten years, for the reasons pointed out with respect to public relations, and because the worst is past and the securities are on the up-grade. Present prices now reflect decidedly past faults rather than future possibilities.

WHAT IS THE BUS TO MEAN?

We have divergent views with respect to the bus and how it will affect the electric railways. It is apparently a fact that neither street railway earnings nor riding habit are going to increase as rapidly in the future as they have in the past, due primarily to the privately owned automobile. But this does not mean that electric railway securities will not be a good investment. There are isolated spots where the street railway is not going to be as well off as it is today. In those places where the population is stagnant, with the use of automobiles on the increase, there must naturally be less business for the street railway.

Of course the bus is going to be a less formidable problem to city lines than it is to the interurban railways. And even on the interurban lines, the bus is not going to bother as much as the private automobile, because we are rapidly coming to the time when the bus is not going to be a free-lance jitney, but instead a public utility in every sense of the word. And as such it is going to work as a part of the whole transportation scheme and work with the street railway and the interurban to handle the transportation of the communities. Buses are not going to be permitted to supersede either street railway or interurban as a competitor. This is as it should be, because if the men who have put money into the present transportation systems are not reasonably protected, as they deserve to be for the development of the territory which they have fostered, no one is going to put up the necessary money to develop fully a new public service.

The interurban still has a real field of service. Buses are going to operate, to be sure, but not paralleling interurban lines, because the regulators are not going to allow this. It is not sound and both are needed and both cannot live in many cases. The solution is co-operation between the two forms of passenger transportation. When the rails wear out on some of the traction lines, the bus will probably take the place of the rail cars, and it will be buses operated by the railway people, as it should be.

Where commissions have no jurisdiction over the buses at present, they must be given this authority.

Conditions in the transportation field will be chaotic until this is done. If the bus is to come, it must come as a dependable public utility. There are no instances yet of a community being properly served on a permanent basis by an irresponsible bus system. The buses need the regulation of the commissions to give them a dependable and permanent character.

What is the best way to attack these problems in 1923? Public relations again. An understanding on the part of the public regarding the true aspects of transportation services will cause commissions to exercise their power where they have authority, and where they have not, will cause them to be given it. We will never get anywhere by simply damning the other fellow. I do not believe this ever gets any one anywhere. We must work with the bus.

Whether or not the improvement in public relations and general financial improvement of the industry has gone far enough so that there will be a noticeable easing in financing for the electric railways is questionable. I think the cycle has hardly progressed far enough yet for this. The readiness with which financing can be done will lag behind improving public relations. But this is not at all discouraging, building program is not necessary. We have not yet reached the ultimate goal in our understanding of ourselves and in our mutual relations with the public. While we may not be able at a safe cost to finance great extensions, we must find it possible to make those improvements necessary to keep faith with our customers, such as more cars and better service. But it is better not to do too much. It is better to perfect what we have than to reach out in extending our rail lines. I never expect to see new street railways financed along the lines we have been accustomed to in the past. In any event we must live within our income.

EMPLOYEES MUST CO-OPERATE

We have talked about our obligations to our customers and to our employees, and these are of foremost importance. But if we fulfill our obligations in these respects we have a right to expect fair treatment from others. Our employees must co-operate with us to fulfill our obligations to our customers. They must sell our service to satisfied customers. They must not expect to dictate the policy of the executives nor to interfere with proper efficiency of operation, assuming always that we have treated them fairly as our associates.

When we give our customers good, efficient service, with courteous conductors and clean cars, the customers must pay for the cost of that service, including the cost of money. When our service is condemned, I am embarrassed and regretfully apologetic, until the fault is corrected. But when the charge for the service which allows only a fair return on the investment is attacked, I am ready to fight, if necessary, for in the final analysis it is our business as executives to secure a fair return on the investment-to make a profit if you will-or there will be no new money available for improvements and betterments in service. And if no new money is available, we cannot do those things which we all know must be done for the benefit of the community served. It is just a plain business proposition. If we are not allowed to make a fair return, we cannot give the needed service, and every progressive community needs good progressive service from its most essential industry.

Conditions in the Industry

D. EMMONS, president American Electric Railways Association, has issued the results of an analysis of the situation of the electric railways of the country. His general conclusion is that conditions have improved during the past year. A summary of his analysis follows:

Despite the growing use of pleasure automobiles and keen bus competition in many sections, more rode on electric railways during 1922 than in 1921, the total number having been in excess of fifteen billions.

Net operating revenues increased 7.4 per cent, although gross revenue was off 2½ per cent owing to general fare reductions per passenger from 7.49 to 7.33 cents. A decrease of 5.9 per cent in operating expenses served largely to offset the fare reduction loss. The operating ratio dropped from 75.2 to 72.4 per cent.

Receivership records, as compiled by the association Bureau of Information and Service from Jan. 1 to Dec. 15, 1922, show that properties with a total mileage of only 517 and total outstanding securities of \$30,986,000 went into receivership, while roads with 458 miles of track and total securities of \$88,729,350 came out.

Receiverships throughout the industry have decreased gradually since 1919, when the peak was reached with forty-eight companies, embracing total securities of approximately \$535,000,000, going into receiverships. Financial conditions with some of the largest companies now in receivership are improving, and at least one and possibly more of them may emerge at any time.

The general tendency among regulatory bodies is to keep fares at a level proportionate to increased material and labor costs. The average fare today in a group of 275 representative cities is approximately 43 per cent higher than it was at the outbreak of the war, while the average wage increase is 91 per cent and the average material cost increase is 102 per cent.

Fares range from 5 to 10 cents in 607 leading cities. The 7-cent fare is operative in the largest single number of cities, 184; the 10-cent fare comes second in 144, and the 6-cent fare third in 102. Other cities of this group are paying as follows: Eight cents, 79; 8 cents fare, 1-cent transfer charge, 26; 5 cents, 20; 5 cents city zone, 5 cents outside, 14; 5-cent fare reduced from higher fare, 13; 6-cent city zone, 7; 5-cent fare, additional charge for transfers, 7; two 5-cent zones, 2; 6-cent zones, 1; 6-cent city zone, 1-cent charge for rides outside, 1; 6-cent zones, average length two miles, 1.

Entirely aside from earnings, the local transportation situation is improved in most communities. The bus situation particularly is clarifying. Whereas a year ago bus competition had reached such a point that electric railways in several cities were compelled to suspend operations temporarily, today managements, regulatory bodies and the public gradually are co-operating more generally in an effort to find the proper place for the bus. Many electric railways are adding supplemental bus service and regulatory bodies are restricting bus lines to territory not served by electric railways and classing them as common carriers, with the same responsibilities as electric railway lines.

A dozen cities have relieved their companies of paving charges, and others doubtless will take similar action during the coming year. Recognition of the fact that present paving requirements are largely relics of horse-car days when the company horses actually wore out pavement is becoming general.



The Double-Truck, One-Man Car Is Popular In Detroit

Electric Railway Engineering Progress of the Past Year

An Analysis of the Accomplishments Which Have Been Made in Recent Months in Track, Car, Power Plant, Power Distribution and Heavy Traction Engineering, Together with Some Comments on the Relation of Engineering to the General Problems of Transportation

AS ONE year closes and another opens it will be beneficial to all of us to reflect upon what engineering has done recently for electric railway transportation and what it may do in the future. In the conviction that the impressions of many engineers in both the manufacturing and the operating fields would be more helpful than the notions of any one man, the co-operation of several scores of such were sought in the preparation of the following notes.

The subject will be examined under the respective heads of track, cars, power generation, power supply and electrification. Before details are examined, however, it is suggested that the messages from a number of engineers given on pages 14 and 16 be perused to form a background for what follows.

Track and Paving

Good track has been seen to be one of the requisites of good service. What are way departments doing to insure continuously good track? Well, among other things they are industriously working to improve joints, foundations, paving and other details. Victor Angerer, of William Wharton, Jr., & Company, Inc., says that the special trackwork manufacturers see a decided tendency to settling down to more uniform practice. The standard sections of grooved girder and girder guard rail are now given preference by probably one-half of the street railways. Several manufacturers have discarded their own systems of track spirals and now follow the "uniform system." Recommended lengths of tongue switches, mates and frogs are being generally followed. H. P. Hevenor, Dwight P. Robinson & Company, is impressed by the way in which the rail joint is developing, by the increased use of the steel tie in paved streets, with a consequent growing tendency

toward the use of rigid track construction, of which the recent installation of 40 miles of such track in Detroit is an example, and by the intelligent way in which laborsaving devices are being used in new construction and maintenance work, as on the Pittsburgh, Cleveland and other progressive properties.

Outstanding in interest to way engineers, and winning their hearty approval, was the recent appropriation of \$10,000 by the American Electric Railway Association for rail-joint tests, followed by subscriptions from railways for a similar amount. E. M. T. Ryder, way engineer Third Avenue Railway System, New York City, reports that the committee on welded rail joints, which is functioning under the auspices of the American Bureau of Welding, is now at work on the proposed rotary service testing machine (see Electric Rallway Journal, Jnue 17, 1922, page 977) and upon the preparation of sample joints to be tested by various other methods. Testing work will probably be under full headway during the coming summer.

According to Francis Tingley, Washington (D. C.) Railway & Electric Company, the urgent question in trackwork has been to select the proper labor-saving tools and, having them, to find extra work for them so as to increase their usefulness. A typical manufacturer's slant on this matter is given by E. P. Seymour, president E. P. Seymour Rail Grinder Company, who reports increasing appreciation of the possibilities of track grinders. The same is true with regard to tie tampers, track drills and other track tools. In the field of larger track machines, H. M. Steward, for example, reports excellent results with the Clark concrete breaker installed last year by the Boston Elevated.

Mr. Tingley also calls attention to the large increase in the use of electric welding equipment, especially in keeping switches, mates and frogs in service for years after they would otherwise have had to be junked. The unofficial affiliation with the American Welding Society, which has come about through the rail-joint test program, will enable way engineers to utilize the best information available regarding the welding art.

The way experts did a good thing last year in securing the appointment of a special committee on rail head and wheel contours. They have believed that rail life can be lengthened by adaptation of these contours to each other. Many wheel experts are dubious about this. A committee with nothing to do but determine the facts ought to get somewhere. If the members differ as to the fundamental facts, all they need are data to determine these. In the opinion of H. Fort Flowers, president Differential Car Company, the work of this committee will eventuate in startling reductions in the number of necessary contours.

The establishment of friendly relations with the welding society was not the only accomplishment of the year in this line. As a result of suggestions from the utility men, the American Society for Municipal Improvements opened its membership to them. There is thus afforded an opportunity to thresh out among engineers the many track and other problems that are of mutual interest to municipalities and utilities.

Another way department salient, so to speak, in the past year or so was the progress made in wood preservation. Railways seem actually to be coming to realize that it pays to make timber last longer. Here is another case where a special committee is at work, and including in its membership men who are practical timber preservationists.

J. N. Dodd, consulting engineer, says that probably the most conspicuous advance in the transportation field last year was the completion of the Frankford Elevated line in Philadelphia. While its mileage is but 6½, this structure is notable for its solid track roadbed, which, with other elements of the design, insures noiseless operation. Other features are the outside platforms and the artistic station buildings. Mr. Dodd gives large credit for the success of the undertaking to the manufacturers for the perfection of detail of the products which went into this enterprise.

TRACK MUST HAVE GOOD FOUNDATIONS

To quote Mr. Flowers again, way engineers have recently realized as never before that next to rail-joint weakness in causing expensive track maintenance comes the laying of the track on inadequate foundations. Where concrete foundation is used it must be of the highest grade, which means the use of labor-saving machines for mixing and transporting materials. He believes in central mixing plants, or mixing cars, recent experiments having shown that an hour can elapse between the mixing and pouring of the concrete without damage.

In this connection T. J. Lavan, assistant general manager International Steel Tie Company, says that during the past year his company has been giving special attention to the method of tamping concrete under the tie structure. Failures of concrete-foundation track, either with wood or steel ties, have been found to be due to faulty installation, principally poor tamping. An example of good tamping which he cited was that done in Kansas City recently under the direction of A. E. Harvey, Kansas City Railways.

As to wood ties, the past year has brought out more

forcibly than before the importance of treatment with preservatives. Also the Philadelphia Rapid Transit Company installed a large number of ties of Douglas fir, an innovation in the East, the result of which will be watched carefully. The interest in substitute ties also seems to be on the increase, according to reports received from the manufacturers.

Considerable perturbation was caused during 1922 by some marked deviations from standard rail sections for use in paved streets, particularly in San Francisco and Cleveland. These were exceptional, however, and affect a small part of the total city mileage. Whether they will ultimately affect the standards depends upon the later extent of their use.

In the meantime the present sections will be assumed to be satisfactory for most cases and attempts will be continued to reinforce their position by securing more users for them. Aside from changes in rail sections, a real and radical accomplishment was made last year, in the opinion of Howard H. George, Public Service Railway of New Jersey, in the substitution for the drop test of the modified Brinell impression test for rails.

JOINT PRACTICE IS CHANGING MOST RAPIDLY

While rail specifications are now reasonably stable, joint practice is far from being so. In 1922 great activity in this field was manifest. Manufacturers have made noteworthy additions to, or improvements in, their products. An example is the practical application of the Jacobs butt-weld joint. (See Electric Railway Journal, June 10, 1922, page 940, and Aug. 26, page 285.) This is now in use to an extent sufficient to give confidence in its future. Seamweld joints have also made substantial progress. On account of their novelty they will be made the subject of early tests by the rail joint committee, which it is believed will yield data such as to reinforce confidence in this type of joint.

That even as well established a proposition as the thermit joint can be improved was demonstrated in 1922 by the change in the reinforcing collar so as to produce a weld with less thermit than was formerly believed necessary. Some rearrangement was also made in the proportions and location of the pouring gate, the heating gate and the riser. A narrower gap is also used between rail ends. J. H. Deppeler, chief engineer thermit department Metal & Thermit Corporation, mentions also as improvements the perfecting of the self-luting mold box and the light-weight pre-heater, as well as the substitution of aluminum for wood patterns in making the rail molds.

Mr. Angerer sums up the present situation in regard to special trackwork about like this: Several electric railways are experimenting with carbon and alloy steels, like nickel-chrome steel, in place of manganese in order to facilitate repair work with the aid of the electric welder. The applications consist mostly in solid castings for switches, mates, frogs and crossings, the same general sections as are made of manganese. The Milwaukee and other properties have successfully installed such structures. In some cases carbon or nickel-chrome inserts or centers were used in place of the manganese-steel centers of the conventional hard-center-construction frogs. The ultimate economy of this practice remains to be demonstrated.

A departure from usual practice which, although not new, made notable progress during 1922, was the carrying through of the flange bearing between intersections of crossings and in layouts where intersections came close together. While this has been done in some cases in the past in solid manganese-steel structures, and was the practice in early days, the effect on wheel flanges limited its application. With modern steel wheels and improved chilled wheels the objections are removed. The smoother riding qualities and long life of the flange-bearing special trackwork have led to the bringing out of girder guard rail sections with shallow grooves for this purpose, and special trackwork utilizing these sections in certain portions is a probable development for the future.

The hope of way engineers and special trackwork manufacturers is greater uniformity in wheel equipment and other features of rolling-stock so as to make possible the designing of special trackwork on closer lines for wear and final economy to the users.

PAVING AND TRACK ARE INTIMATELY RELATED

An important point of contact between municipal and utility engineers comes about through the intimate relation of street paving and track structure. Their points of view are naturally diametrically opposite. E. P. Roundey, New York State Railways, sees a tendency on the part of the municipal engineers to recognize that the railways are carrying more than their share of the paving responsibility and expense. It is to be hoped that he is correct in this. Certainly the conference held on Oct. 9, 1922, under the auspices of the Philadelphia Engineers' Club, with the purpose of bringing out all sides of this question was a notable event of recent months.*

Way engineers have taken an active part in pushing the campaign for paving-burden relief, as the burden affects their department primarily. Mr. Ryder calls attention to the fact that the special committee of the New York Electric Railway Association considering this question concludes that the maximum obligation that should be imposed is the cost of repairing and renewing pavement in the railway area in excess of the cost of repairing the same amount of pavement in adjacent city-maintained areas. This viewpoint was clearly set forth in addresses by A. T. Davison, Third Avenue Railway System, last year.+

J. B. Tinnon, Chicago & Joliet Electric Railway, emphasizes the failure of most types of pavement to withstand the excessive loads imposed in the track area by motor trucks, which in many cases now far exceed the car loads. In his opinion the whole design of track construction will have to be changed on this account.

Some Notes on Rolling Stock

Never in the history of the electric car has its evolution been taking place more rapidly than it is at present. Testimony is unanimous to the effect that weights must come down, and designs must be made for one-man operation to the maximum possible extent. Weight reduction in city cars has been in the lead, but this movement has now reached the interurban field. A notable feature is the development of light cars for schedule speeds of 25 m.p.h. and over, with a maximum speed of say 50 m.p.h. This will result in power and maintenance saving and in general operating economies. In many cases present heavy cars can profitably be

replaced with the lighter ones. W. G. Stuck, Lexington (Ky.) Traction & Terminal Company, goes so far as to believe that there are cars weighing 75,000 lb. and equipped with 75-hp. motors that should be replaced with others weighing 25,000 lb. and carrying 25-hp. motors. A report from another source states that this development is illustrated by Mr. Stuck's company and others in the vicinity. For example, the Cincinnati, Milford & Blanchester Traction Company has, in four and one-half years of operation of a type of car weighing 25,600 lb., saved in operating more than \$15,000 per car. At the end of this period maintenance costs are low. Operation of this type of car costs 17 to 19 cents per mile.

Many cities also have had success with the one-man double-truck car, although its design is still in the development stage. A complication is the provision for rush-hour traffic, but this is being met by various mechanical devices or by provision for putting on an extra man in the rush hour. An outstanding example of the double-truck one-man car is the type of car now being built by the Chicago Surface Lines.* Dissatis-



The Variable-Load Air-Brake Attachment, Applied to Surface Cars, Is One of the Technical Developments of 1922

faction that has developed in some places regarding the operation of one-man double-truck cars is at least partly due to the way in which old bodies, not inherently well adapted for this purpose, have been changed over. Obviously, to be successful such a car must combine safety, comfort, good loading qualities and general convenience of operation.

There is a proper division of the transportation field among one-man single-truck, one-man double-truck and other types of cars which has not always been appreciated. This was recognized practically in 1922.

In all of this design the possibility of using stronger and lighter material needs consideration. A consistent advocate of this has been J. M. Bosenbury, Illinois Traction System. He recommends superior material, such as alloy steels, in order to reduce weight, insure safety of passengers and minimize maintenance costs. In line with this is the increasing extent to which lumber and sheet metal substitutes, such as Agasote, Haskelite, Plymetl, etc., are being employed for roofs and sides. These minimize weight and increase strength. For example, Haskelite plywood roof is claimed to be 30 to 40 per cent lighter than ordinary wood, and many times stronger and stiffer.

The statistics printed elsewhere in this issue tell the story of present preferences as to general features of car design. They illustrate what has been said above and indicate a great change as compared with a few years back. The changes in car equipment show prog-

^{*}See Issues of this paper for Nov. 4, 1922, page 747; Nov. 11,

[†]See issues of this paper for July 1, 1922, page 19, and Nov. 18, page 823.

^{*}See issue of this paper for Sept. 30, 1922, page 514.

ress also, but are not so radical. In the case of motors. for example, these have been brought to a degree of ruggedness and serviceability which was never before approached.

The insulation of the motors has been bettered by the use of materials and methods which give greater protection from the effects of vibration, heat and moisture. Mechanical strength has been added to enable the motors to withstand the racking punishment of present-day railway service.

Noteworthy is the rapidly increasing popularity of the field-control motor which was installed on several hundred subway cars during the year. This motor is adapted to severe duty, high speed and difficult schedules, which are incidental to subway passenger service. One manufacturer reports that a total of 175 equipments of electro-pneumatic control have been installed on city and light interurban cars, nearly all of these being mounted in cabinets. This control embodies switches of the unit type, the idea being to provide flexibility in mounting the switches, lightness and accessibility.

The aluminum field coil for motors was a development that aroused much interest. This is made of rectangular wire by the following process: The bare wire is wound into a coil, paper spacing strips being inserted between layers. The coil is then heated and immersed in an oxydizing solution. It is then reheated

New Year's Messages from Engineers You Know-I

How 1922 Forwarded the Cause of in getting substantial results in stand-Electrification

There are fundamental reasons for electrification which are now being more fully recognized by steam railroad executives and banking interests behind them, so that immediate construction can be anticipated. Perhaps no single factor has contributed more to this conclusion than the shopmen's strike during the past summer and its effect upon steam motive power. I therefore regard 1922 as having contributed largely to our understanding of the advantages of electricity over steam and expect that 1923 will witness active construction growing out of this knowledge.

-A. H. Armstrong.

Automobile Is Here to Stay

Experience gained prior to and during the past year has shown more clearly than ever that the automotive vehicle is here to stay, and must be met by electric railways in a spirit of co-operation rather than in one of antagonism. The railways must constitute themselves as transportation companies and utilize the bus as an aid, either as a feeder to existing lines or as a substitute in certain cases for existing lines.

- John A. Dewhurst.

The Automatic Substation o Factor

The active interest in the automatically controlled substation indicates an effort to reduce operating costs. This is necessary to effect ultimate lowering of fares from war-time figures and to meet competition, in some cases, from other transportation agencies. Along with this interest, and for the same purpose is the tendency to collect and study data on general operating conditions, such as trolley-wire wear, life of poles, etc. -Adrian Hughes, Jr.

Help Along the Cause of Standardization

At this time there should be emphasized the substantial step forward that has been taken the past year by the American Association in co-operation with the American Engineering Standards Committee. The latter is making remarkable progress, not only in the review and approval of standards but in the co-operation with the Federal Specifications Bureau. There never before has been the opportunity that we have today

ardization. All electric railways, as well as the associations, should renew their efforts in the direction of standardization to the fullest possible extent.

-Martin Schreiber.

As the Engineer Sees It

Although outside the range of engineering, the following appear to me to be the significant elements of the electrical railway business at present: (a) Growing recognition of the fact that the business of a transportation utility is to transport by the means best adapted to get business; (b) growing appreciation of the necessity for going after business, by convincing the public that the service given is just what it wants, and really trying to give such service; (c) continuation of rational such service; (e) — policies of economy, — Charles Rufus Harte,

Sentiment Favors Labor-Saving

The use of labor-saving tools has done more, in the engineering field, during the last few years to increase output than anything else than I can recall. It was very difficult a few years ago for the engineer to secure authority to purchase such tools if they were expensive. Today, I believe, most companies are willing to purchase them as there is no question as to the return on the investment.
-R. H. Dalgleish.

A Real Co-operative Movement

It seems to me that the most significant thing that has recently occurred, although of course it was not confined to the past year, is the tendency for engineers, manufacturers and others concerned to get together for the purpose of setting standards. This is a real cooperative movement and one which must be productive of good, even though some of us may have to sacrifice some of our pet ideas.

-Il. S. Murphy.

Times Are Better

The year 1923 should show considerable progress for the reason that the railways have gradually been getting back to more normal conditions and it is only reasonable to expect that the improvement will be reflected in a more iberal outlay for upkeep and maintenance of track, special trackwork, and other parts of the electric railway plant. —II. R. Sherman.

Value of Research Work Increasingly Recognized

The fuller realization, which is in evidence on every hand, of the importance of research work as applied to some of the stubborn problems facing the industry, with actual research work now under way on the rail-joint problem, leads to the hope of early inauguration of a real study of that cancer of the industry known as rail corrugation. The past year was a milestone in electric railway engineering because of the conviction on the part of executives that expenditure of money on research by the association is a wise investment. -R. C. Cram.

Speed Up the Cars

The electric railways are alive to the growing competition from other means of transportation. To meet this the operation of cars should be made as noiseless as possible and their speed should be increased. Speed should be had both by increasing the running miles per hour and eliminating unnecessary stops. The old saying "time is money" applies to car riders, and their time should be conserved up to the safe limit of speed approved by modern practice. —J. H. Haylow.

Everybody Lend a Hand

Electric railway engineers throughout the country should support the co-operative efforts which are being made in their behalf by such agencies as the American Engineering Standards Committee. They should assist the American Association in furnishing data which will help in the solution of pressing problems. will be work for many engineers in addition to those who are now taking -M. B. Rosevear. an active part.

Good Service Will Induce Riding

During 1923 there will be more use made of automatic substations in city service and also a more general use fo them in interurban practice. Also the light-weight one-man city car is going to have its effect on the general operating conditions of the electric rail-way. If we give good and frequent service the people will ride. Furthermore, the growing city congestion due to the parking of automobiles in the business districts will force radical action by municipalities, which will have a tendency to increase the car-riding factor in all communities. —John M. Drabelle. and dipped in insulating varnish, after which it is wrapped in oiled bias linen strip and webbing. Finally it is dipped in insulating varnish and baked. High insulation and lightness are the particular qualities claimed for this type of coil.

TURNSTILES SEEM TO MEET A REAL NEED

Among the by-products of one-man operation is the car turnstile embodying an old principle, but applied in a new environment. The experience of the New York State Railways with this device on rear-entrance, front-exit cars in Syracuse and elsewhere is well known. Recently an adaptation of the "feather-weight" turnstile used in the subway stations has been tried on the New York Railways cars, in New York City, apparently with good results. The principal function of the turnstile is to permit unrestricted passage in only one direction. It can, if of the registering type, be used also to indicate the number of passengers on the car, the incoming passengers registering positively and the outgoing ones negatively.

Car turnstiles are mentioned specifically this year on account of their novelty. The bulk of the duty of insuring accurate fare collection and recording, however, still falls upon the standard fare boxes and registers, toward the perfecting of which steady progress is being made.

Undoubtedly the most important development of the year in this field was made by the Johnson Fare Box Company in its new combined fare box and register. This is motor-driven and provides three separate registering features: The usual disk on the side of the fare box, a large register located on a rod above the box and in plain view throughout the car and an indicator at the level of the conductor's eye which is a telltale on the fare deposited by individual passengers.

An interesting device was also brought out by the St. Louis Pneumatic Devices Company for attachment to existing fare boxes. This eliminates cranking of the box and at the same time sorts the fares. The Ohmer Fare Register Company also brought out a new detail fare printing interurban register which furnishes for a large variety of cash fares and paper tickets a printed record of each fare with origin and registration in each zone.

The International Register Company has also developed the idea of motor drive for its registers as was illustrated in the exhibit at the Atlantic City convention, where the improvements made by the Cleveland Fare Box Company in its lock boxes were also shown.

A radical change in design of the Rooke portable fare register was brought out last year. This device was formerly used for collecting and registering one coin. It can now be had in a form in which any coin up to and including a quarter can be registered through one slot.

ENGINEERING AS APPLIED TO CAR DETAILS

An illustration of the way in which reduced car weight brings about other developments is furnished by the variable-load air brake, recently adapted to surface cars and applied initially for the Eastern Massachusetts Street Railway. On light cars the required braking force required for uniform stopping distances varies notably with the load, which at times may equal that of the empty car. The air brake lends itself well to the addition of an attachment which controls the available braking force through variation in distance

between the body and truck bolsters under varying load.

Other illustrations are found in the many devices recently developed to relieve the operator of miscellaneous operations. Air operation of doors and steps, thermostatic control of temperature and other features of a modern car, while not new, fit in well with the one-man plan of operation.

Gearing offers another attractive field for investigation. During 1922 service tests of the helical gear continued, more than 30,000 gears being in use, and practice tended to settle down to a steady gait. A new pinion design, involving the use of the so-called "wisdom tooth," made its appearance. This is a thicker-root tooth which can be run successfully with worm gear teeth. It requires more room on the pitch circle and, for a given size, runs one less tooth to the pinion. The manufacturer states that a considerable number of railways are using the pinion either regularly or experimentally and that comments regarding it are favorable.

The year 1922 was a banner one for the car meter, which is used for energy checking in connection with inspection and maintenance procedure. One of the best things that engineers are doing for their properties is in urging more careful operation of cars and a higher degree of maintenance.

In and Around the Power Plant

In his annual review of the power-plant situation, John Liston, General Electric Company, notes as the outstanding tendency that toward the concentration of generation, transformation and distribution of electrical energy in large units of constantly higher guaranteed efficiencies. The maximum size of steam turbine sets was advanced to 62,500 kw. during the year, and of water-wheel generators to 65,000 kw., with corresponding increases in capacities of switching and auxiliary apparatus.

Coupled with this tendency is another in the direction of further use of automatic control. E. H. Scofield, engineer of power Twin City Rapid Transit Company, who has made a close study of this matter, states that many features of automatic equipment applicable to the governing and controlling of boiler and stoker equipment operation are available. There is needed, however, a co-ordinating of all of these to perfect a complete system, including all elements essential to full automatic control.

In combustion engineering the conspicuous development, because novel, is in the burning of pulverized fuel. A number of installations are being made, including one in the United Electric Railway's power plant in Providence, R. I. The Quigley Fuel Systems, Inc., states that experience has shown that powdered coal can be burned economically when pulverization does not go finer than 70 per cent through a 200-mesh screen. The moisture content, under some conditions, can be 5 per cent or more. The tendency in general is for the use of a larger combustion chamber, properly designed for the protection of the refractory linings. The Combustion Engineering Corporation expresses the opinion that pulverized coal is the present super-station fuel. with multiple-retort stokers and stokers of the Coxe traveling-grate type making a strong bid for leadership.

The power-plant boiler and its furnace are going through changes at a rate indicating alertness with respect to the needs of the time. Aside from providing mechanical perfection in their product, the boiler builders can assist in reducing energy costs by providing for a higher pressure and higher temperature. A. G. Pratt, vice-president Babcock & Wilcox Company, states that improvement in stokers, mechanical oil burners and economizers have resulted from the endeavor to get more economical and efficient service from given boiler. superheater and economizer areas. His company has, as a result, developed the Waukegan type of boiler, which is being built for pressures from 350 lb. up. Boilers of this type for 600 lb. pressure are now being

The Waukegan boiler is built with two decks of tubes,

the lower of 31-in, and the upper of 2-in, tubes. The superheater is between decks. The lower tubes are exposed throughout their entire length to the fire and there are no baffles in the lower section. The higher pressure is permissible in this boiler due to the small tubes and the extra strong headers.

Mr. Pratt states that for pressures from 250 to 350 lb. engineers have shown interest in the new Cheswick type of cross-drum boiler, in which the superheater is placed between an upper and a lower deck of tubes, and the tubes of the lower deck are exposed for their entire length.

Improvements in boiler and furnace design have increased the heat absorption by the tubes ahead of the

New Year's Messages from Engineers You Know—II

Good Maintenance an Element in Service

In order that electric railways may better meet the increasing competition of the gasoline bus, their equipment must be carefully maintained so as to increase the attractiveness of the cars. Clean, attractive cars, not overcrowded during the rush hours, together with carefully maintained schedules, will bring back the business. The electric railways should themselves go into the bus business to supply feeders for their lines.

—W. Schaake.

Steel Container a Promising Development

The most important thing railways have to face at present is an improvement in freight handling. The length of time required for handling 1.c.1. freight is practically prohibitive, and the rail-ways will lose all of that business where it is possible to obtain transportation by other means. The steel container appears to be one of the best things that has appeared in recent years to facilitate the handling of such freight. The congestion on the railroads is mostly at the terminals, and that is where the big improvement must be made. Electrification should play a large part in this work. -N. W. Storer.

Why 1923 Should Be Progressive

I expect to see in 1923 at least a partial recovery of the electric railways from their unfortunate financial condition resulting from the increased operating costs of the war period. This, I believe, will be brought about by concentrated effort on the part of electric railways throughout the country, by the proper use of advertising matter and by co-operation with the public. Certainly the better the public understands the transportation business the better it can judge of the need for relief. -L. F. Griffith.

Urge the Open Mind

More than any one thing in the electric railway industry we should urge the open mind. There are many places where competition with other transportation agencies should be replaced with cooperation. The field of our work is local and interurban transportation, and the attention of our entire personnel should be centered on transportation rather than street car problems. It is within the

Province of an urban transportation company to handle not only street car and auto-bus transportation, but also package deliveries for department stores and others, general trucking and even taxicab service. I look to see the day when the existing plants of street railway companies will be used during offpeak and night hours for freight transportation. Moreover, I believe that this freight business can be worked up in conjunction with the steam railroads and can be made the basis of community good will, if only the idea of "service" is held to the front.

-J. P. Barnes.

Engineering and Transportation Competition

One of the outstanding things that electric railways might do from an engineering standpoint is to make more complete studies of their schedules to determine what can be done to bring about operating economies and improve facilities better to meet the increasing competition from automobiles and other means of transportation. The human factor, also, ought to have careful consideration.

-Edwin D. Dreyfus.

Six Things to Be Done

We should urge: (a) Improved service as regards condition of equipment and frequency of operation; (b) adoption of light-weight cars for city, suburban and interurban service and operation of these by one man wherever practicable; (c) use of automatic substations and purchase of power from large central stations; (d) continuous use of safety cars in city service; (e) extension of existing rail routes by means of trolley buses; (f) replacement of old types of rolling-stock and equipment with modern apparatus. -H. L. Andrews.

Utilizing the Collective Effort of the Industry

If I were to suggest any principle to be urged upon our engineers, it would be that every one should endeavor to utilize more fully and contribute more to the collective effort of the industry. We should each try to know more about the work that has been done and made available for application to our own problems, and we should each give reasonable encouragement and assistance to those who are seeking to make available to the industry the results of their individual experience. -Ralph W. Eaton.

Service Is the Answer

Especially during this time of more or less inflated prices the service must be the best possible, and it must remain so as normal conditions return. Ker lar and frequent service is the chief at the tion of this service. All engineering n-siderations controlling the industry i ust be studied, such as routing, typer of track, d signs of equipment and 'antrack, d signs of equipment and 'andling of schedules. Only thus can a meetition be meet -S. Clay Fater petition be met.

Possibilities of Freight Hauloge

A phase of transportation work which is bound to come in for further devilopment is that of urban and intererban freight haulage, making a better is of present city tracks. The movement ow on foot to improve the use of streets will result in restriction of vehicular tr ffic, with consequent opportunity to sperd up street car service. —Karl A. Sin i on. street car service.

Good Track and Light Cars

My only suggestions as to meeting the competition from other transportation agencies are, first, that tracks be constructed with a view to securing the longest possible life and, second, that the lightest cars which are adequate for the service be operated. These practices will tend to economy in annual track cost and in car upkeep also .- H. M. Steward.

A Good Word for Standardizet'on

I look for an increasing adoption of the ideas of standardization, although I am not unmindful of the opposition to this on account of the fear that it will stifle initiative. Looking ahead, I think that electric railway managements should heed more and more the advice of engineers as to the economic points involved in meeting the competition from other transportation agencies and should more widely advertise them. - John R. Mc Kay.

Competition Must Be Met

To my mind one of the most important factors in our industry today is the growing competition from both public and privately operated automobiles. The most pressing need for engineering development is along the lines which will increase the safety, comfort and convenience of our passengers in order that service may be further improved and thus competition more fully met.

_J. II. Ilanna.

usual position of the superheater. At the same time there has been a demand for higher superheat and a greater quantity of steam per hour at higher pressure. This condition has brought about the design of the radiant heat superheater, which is placed in one or more walls of the combustion chamber. The Power Specialty Company, which builds the Foster superheaters, has developed also an economizer which is an integral part of the boiler unit.

NEW FEATURES OF STOKERS, TURBINES, ETC.

A good example of what is going on in stoker design was furnished by the Twin City Rapid Transit's new Westinghouse stokers, described in the issue of this paper for Aug. 12, 1922, page 221. Here a low-grade clinkering coal is successfully burned on an underfeed stoker.

The Combustion Engineering Corporation has also put out a new type, the Frederick stoker. This is a multiple-retort stoker of the super-station type; that is, the grate area is large. Moreover, it can be made of any length by simply adding tuyère units without change of design. The Sanford Riley Stoker Company has also brought out a radical departure in a superstoker which is being tried out in the Delray station in Detroit. It has long retorts, with other dimensions suitably increased. There are thirteen retorts fed by eleven rams of 12-in. stroke. These retorts will feed coal as rapidly as twenty-six retorts in the double-end stoker. The tuyères or grate blocks are movable in a direction parallel to the path of the coal. The length of travel is adjustable and under the control of the This stoker can be made to suit furnaces operator. from 13 ft. to 20 ft. in depth. Another new Sanford Riley specialty is the Jones lateral retort stoker, which is a side-cleaning stoker and can be placed under boilers of from 150 to 500-hp, capacity without the necessity for raising the boiler or making extensive basement construction for ash removal.

The American Engineering Company, builders of the Taylor underfeed stoker, notes a tendency of the past year to obtain greater outputs per square foot of boiler heating surface or to use higher boilers. The tendency to obtain higher outputs from existing boilers is illustrated in the recent stoker replacements in the power plants of the Philadelphia Rapid Transit Company and the Capital Traction Company in Washington. The American Engineering Company has developed a stoker which can be built to burn up to 2,500 to 3,000 lb. of coal per retort per hour.

The Green Engineering Company has recently been developing its forced-draft chain or traveling grate, the engineering problems of interest during the past year having been along lines of low-pressure, liberal-air-space, forced-draft stokers. Special attention has been given to water cooling of furnace side walls along the fuel and clinker line. In the opinion of engineers of this company, furnace maintenance is an outstanding problem. Boiler heating surface absorption has not yet reached its limit, but maintenance of furnace side walls and prevention of clinker and slag formation along the fuel line must be met by water or air cooling and improved refractories.

The most important boiler auxiliary is the feed-water heater, which is being developed to keep pace with the boiler. In the opinion of engineers of the Harrison Safety Boiler Works—Cochrane Corporation, among the most promising opportunities for power-plant improve-

ment are those connected with the handling of feed water and the selection and arrangement of auxiliary apparatus for carrying out the steam reheating cycle. The apparatus will include that for stage feed-water heating, de-aeration of feed water, and in many cases distillation of make-up water. Air heating has possibilities, for in their opinion, the steam cycle will be most efficient when the feed water is heated entirely by steam extracted during the expansion process. Then if at the same time boiler and furnace operation is improved by reclaiming waste heat from the flue gases to heat air used for combustion, the maximum plant efficiency will be realized for given initial and final temperatures.

Just a word regarding coal and ashes handling in the power plant, a subject of real interest at this time. R. H. Beaumont & Company see a tendency to a preference for the skip hoist for handling coal. They have therefore devised what they term the "super central coal and ashes handling system." It comprises one or two skip hoists to elevate the coal from the railroad cars to bunkers, with a separate skip hoist to elevate ashes to the ash bunker. Coal is distributed to the boilers with weighing larries, and ash larries transfer ashes to the ash skip hoist. Both coal and ash bunkers, skip hoists and all machinery are housed in a separate building at the end of the power house.

Some General Electric turbine developments were mentioned earlier. The Westinghouse company has developed its large single-flow turbine with a single exhaust, which has been sold in sizes of 20,000 and 30,000 kw. These are provided with multiple-stage feed-water heating connections.

The Allis-Chalmers company has introduced in its latest turbines a new method of baffling to prevent steam leakage over the tips of the blades. The clearance of one flange of the shroud which surrounds the blade tips has been changed from radial to axial by bringing the flange close to the adjoining foundation ring.

In the ventilation of electric generators there is increasing interest in the air washer and cooler, especially when used in the closed system wherein the ventilating air is confined in a closed circuit and used over and over. The Cooling Tower Company reports the success of its "Impact" washer for this purpose, and the Spray Engineering Company has developed its Type V (vertical) washer and cooler for the same purpose. The latter goes in the generator foundation. Hot air enters the top of the washer, passing vertically downward and dividing below into two streams, which are then directed upward into the generator inlets. An emergency damper is of course provided to close the circuit in case of fire.

Significant Things in Regard to Power Distribution

In the opinion of many, if not most, distribution engineers the outstanding feature of the work in this corner of the engineering field is the automatic substation. Even where it does not seem immediately available it is of interest because it is one of the few devices that are in the development stage. Closely following this in interest is the standardization of overhead construction and the development of higher strength trolley wire with greater resistance to wear.

During the past year real progress has been made

ending the misun-

derstanding and

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rules was recog-

nized. Of the same

general nature

was the joint work

between the Amer-

ican Telephone &

Telegraph Com-

pany and the

National Electric

Light Association

on the subject of

"inductive co-or-

dination." It looks

as if the compa-

nies engaged in

the transmission

of intelligence and

power respectively

would actually get

together suffi-

ciently to agree on

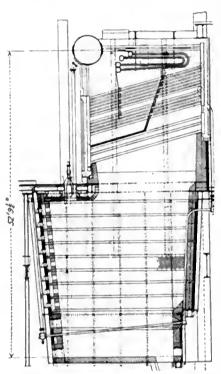
construction

which will be mu-

tually acceptable.

Electric railways are vitally con-

in inaugurating joint action by all parties interested in wire crossings, with a view to revision of the National Electrical Safety Code so that it will be generally acceptable. The American Engineering Standards Committee is functioning in this connection and furnishing a clearing house for co-operative effort. Ralph W. Eaton, public service engineer, Providence, R. I., states that he knows of no more significant or important occurrence in the electric railway engineering field than the real progress which was made in this connection. The manner in which rules for overhead construction are being adopted, he says, gives bright promise of



Boiler Setting for Pulverized-Fuel Burning

The width of the holler shown is 24 ft. 10 in., the furnace width directly under the arch 19 ft. 9 in. and the volume of the furnace 12,200 cu.ft.

eerned in this matter to the extent that their lines are or may be alleged to interfere with telephone circuits.

As to electrolysis co-ordination, that appears to be farther along, thanks to the national joint committee. This committee has issued its second report and is doing a steady but non-sensational work.

As M. B. Rosevear, of the Public Service Railway and chairman of the Engineering Association committee on power distribution, puts this whole matter, the spirit of co-operation seems to be actuating all of the national organizations and interests. This, he thinks, is duclargely to the American Engineering Standards Committee, which deserves the whole-hearted support of engineers and others concerned in its work.

AUTOMATIC SUBSTATION IS FORGING AHEAD

The past year was a good one for the automatically controlled substation, both in the technical advances made and in the volume of business. Remote supervisory control deserves special attention because it adds to the non-manual features the advantages of ultimate centralized manual control. This is now being installed for the Cleveland Railway, where standard telephone

lines are used for the supervisory manipulation and at the same time they remain available for the usual communication. The Westinghouse company installed last year the first automatic substation for a trolley-bus line, on Staten Island, New York City.

John Liston, who was quoted earlier, points out that during the year work on some exceptionally large installations was begun not only in the United States but in foreign countries, the most notable example being that for the South African Railways. In other words, the new control has invaded the heavy traction field. In this country the Oregon Electric Railway will shortly put into service two 1,000-kw. and five 500-kw. stations on the 1 200-volt line operating out of Portland. This will leave but one manual substation on this road. Another group comprises five 750-kw. equipments for the Wilkes-Barre & Hazleton Railway, while what was probably the largest order was that placed by the United Railways of St. Louis for four 1,000-kw. and two 2,000kw. control units. The Chicago, Aurora & Elgin Railroad will install two 1,000-kw. units as the results of trial service covering several years of a 500-kw, station at Warrensville. These stations will have the new supervisory control. The Northwestern Elevated Railroad in Chicago is installing a 2,000-kw. station, the first application of automatic control to metropolitan elevated service. Other interesting installations include three 1,000-kw. units for the Hydro-Electric Commission, Toronto, Ont.; one 1,000-kw. unit for the Pacific Electric Railway; one 1,500-kw. and one 500-kw. unit for the Public Service Corporation of New Jersey and four 300-kw, units for the Cincinnati, Georgetown & Portsmouth Street Railway.

THREE PHASES OF TRANSMISSION LINE ACTIVITY

The remarks made above regarding inductive co-ordination indicate one of the active items in transmission line development from the administrative standpoint. Physically speaking, interest centers in poles, insulators and wires and cables.

First as to poles, the National Tube Company notes an increasing tendency to employ steel for this purpose, although wood still leads as a pole material. According to the latest figures compiled by the American Association, of the 408,833 poles in service on a group of large properties, 55 per cent were wood and 38 per cent steel. Concrete poles are giving a good account of themselves. The Massey Concrete Products Corporation, maker of a reinforced hollow concrete pole, reports that after several years of service trials of its pole, which is made by the centrifugal process, the past year saw this type of pole out of the preliminary stage. The makers of the Bates expanded steel pole took a forward step last year in extending the range of sizes to include 7 in, and 8 in. They have also developed a plan for precasting concrete foundations at a central point, with bolts set to template, with the idea of saving material and facilitating erection.

The Electric Railway Equipment Company reports increasing appreciation of the combination trolley and lighting pole which was installed in a number of cities during the past year with a view to increasing the attractiveness of the overhead construction.

In the wire and cable field an urgent need for standardization is felt, and there is hope on the part of both manufacturers and users that something in this line will be accomplished through an A.E.S.C. committee which is now at work. Opinion seems to favor

specifying the sizes of stranded conductor in terms of the number and sizes of strand. W. A. Del Mar, chief engineer Habirshaw Electric Cable Company, states that the application of scientific principles has resulted in a material improvement in the power factor of cables with impregnated paper insulation, with increase in the breakdown voltage of such cables. H. T. Dyett, president Rome Wire Company, expresses the hope that users of wire in the electric railway field will co-operate with the manufacturers in order that the best possible products may be available at a reasonable price.

Insulator development has gone along with that of poles and wires. The manufacturers of the Thomas insulator say that perhaps insulators have been considered too much from the electrical and not enough from the mechanical standpoint. The serious problems of the manufacturer are mechanical; that is, to make a structure of porcelain and metal that will withstand extremes of heat and cold and exposure to sun and rain without cracking. This requirement being met, the obtaining of adequate resistance to flashover and puncture are relatively easy. One manufacturer (Lapp) has adopted the plan of making the porcelain in a vacuum and uses drop forged caps.

Improvemen's in signals during the past year were principally in refinement of detail, the manufacturers being concerned principally in development of train control for steam roads. To illustrate, the General Railway Signal Company worked out a unit construction for signal light, each unit containing lenses and a lamp and removable as a whole or in parts.

GETTING MORE WEAR OUT OF THE TROLLEY WIRE

Last year the distribution engineers showed a real desire to learn why trolley wire wears out and how to make it wear out less rapidly. Researches were conducted and will be continued in this field. The manufacturers of phono-electric wire conducted experiments during the year, and will soon give the industry the benefit of the results.

Mr. Cope, of the Westinghouse company, mentions several improvements in overhead line material which have a bearing on the life of the trolley wire. For example, there is the Cleveland splicer with a solid body which eliminates shrinkage strains in the castings. A new 15-deg. rigid insulated crossing has been developed. This has micarta runners.

Excellent results have been secured by the Public Service Railway and others with a new trolley ear which is designed with a tapered approach from the tip of the ear to the point immediately under the boss, at which point the lips almost encircle the wire. This is a recent Ohio Brass product.

A novelty in porcelain was the car-stop sign and strain insulator introduced toward the end of the year by the American Porcelain Company.

The subject of switching is too large and technical for detailed discussion here. It will be of interest, however, to record the extension of the high-speed principle in circuit breakers to 600-volt service. This type was originally developed for the Chicago, Milwaukee & St. Paul electrification, but it is now being used for protection of 600-volt stations and individual machines, as well as for feeder protection. A valuable addition to the standard line of relays is found in the line sectionalizing relay known as the impedance or distance relay. During time of trouble it is acted upon by both the current and the voltage of the circuit, and from these

values it automatically calculates the distance of the short-circuit from the relay and the time of operation is determined accordingly. Still another development was the application of motor operation to high-tension disconnect switches and air-break switches.

1922 WAS A GOOD YEAR IN THE FIELD OF HEAVY TRACTION

There are encouraging signs in the field of steam railroad electrification, indicating a resumption of a healthy rate of growth. The Illinois Central terminal project in Chicago reached the point of selection of system, 1.500 volts, direct current, and this choice seems to have met with general approval for the local conditions. In accordance with the terms of the contract with the city this work must be carried out on a definite schedule. The postponement of the Lackawanna Scranton grade electrification was a disappointment to all persons interested in the logical spread of electric motive power applications, for conditions seemed exceptionally favorable in this case for a profitable investment. Difference of opinion as to the proper system for this section is reported to have been at least a partial cause of the postponement. This indicates that electrification is not considered by the railroad directors to have progressed as far as it is generally supposed to have done.

Electrification maintenance had a remarkable test during the past year on account of the shopmen's strike. Testimony is general to the effect that the electrical equipment withstood the impaired maintenance at least as well as the steam equipment, and certainly in a highly creditable manner.

The shops of both large American as well as those of the foreign manufacturers of heavy traction equipment clearly reflect the present status of electrification progress. The General Electric Company is building two 120-ton locomotives for the Baltimore & Ohio Belt Line in Baltimore, which was electrified about twenty-eight years ago.

Among foreign orders are substantial ones from Spain. France, Chile, Japan and Mexico. Ten 150-ton, 3,000-volt d.c. locomotives will be supplied to the Mexican Railway for changing the 30-mile Vera Cruz-Mexico City line from steam to electric operation. Energy for this will be purchased from the local power company, and only one substation will be required for the entire line.

Six 3,000-volt d.c. locomotives for the Spanish Northern Railway are nearly completed. They will be the first 3.000-volt machines in Europe. A 1,500-volt d.c. machine of the gearless type for the Paris-Orleans Railway is under construction, and two 1,500-volt, 66-ton d.c. locomotives were recently shipped to Japan for use on the Tokaido Railway.

The Westinghouse company has under construction twelve 180-ton a.c.-d.c. locomotives for the New Haven Railroad, four a.c. locomotives to weigh each nearly 400 tons for the Norfolk & Western Railway and three locomotives for the Pennsylvania Railroad, one 11,000-volts a.c. and the two others 600-volts d.c. For foreign customers there are on order or recently shipped thirtynine 3 000-volt d.c. locomotives for the Chilean State Railways, six 3,000-volt d.c. control equipments for the Spanish Northern Railway, 120 control equipments for the Paris-Orleans Railway (1,500-volts d.c.), and two 60-ton, 600-1,200-volt locomotives for the Japanese Government Railways.

Proven Improvements Available fo

How MANY of these economy and betterment measures can you check off ☑ as done? How many can you check off ☒ as thoroughly considered and found not applicable to your conditions? How may blank squares remain to indicate backwardness or to show where your studies should be directed in 1923, if you are to keep pace with progress?

Have you inaugurated a system for the periodic checking of traffic and the re-	Have you looked into the possibilities of hauling livestock?
scheduling of cars on all lines, so that service will follow changing traffic, avoiding wasteful	Are you using modern turbine equipment in your power plants, or are you retaining
car-miles but providing all the transportation that will be bought?	obsolete prime movers, reciprocating engines or early type turbines, dissipating profits in
Have your cars been rerouted to better	wasted heat units?
serve traffic as material changes in course of travel have taken place?	Have you modernized your generating plant by the installation of economical
Have you discarded the ponderous obsolete cars and substituted the use of light-	auxiliary equipment, metering devices and automatic control and test equipment?
weight one-man cars in light interurban service?	Have you begun the installation of automatic substation control to reduce labor
Are you making full use of one-man safety cars in city service?	charges, save energy and free the system from possibility of shutdown on strike of a handful
Have you entered upon a program of	of men?
revision of the better existing cars for	Have you given your line materials the
operation with one man on light interurban and suburban lines and the lighter city lines,	ing stock, track and power system? Many
utilizing safety devices to improve safeness of	improvements in line materials and construc-
such operation and for psychological effect on	tion have been made which increase the life
the public?	of the overhead and decrease the work and number of trouble crews.
Have you substituted modern for ancient	
motors, saving weight and energy con- sumption, maintenance expense and road	Are you utilizing modern steel poles in the cities for economy, permanence and
delays?	appearance?
Are you using a modern fare collection system with approved fare box and a mod-	Have you substituted machines for hand work and saved labor costs to the great
ern system of fares, eliminating a lot of ticket	extent possible in the track department?
printing costs and accounting expense?	Are you using the highest developmen
Have you gone after freight business, including through service with other lines?	in special trackwork to reduce the main- tenance charges on both track and cars?

ettering Operation	Are you using closed vestibules to reduce accident expenditures?
Are you utilizing substitute ties where they would decrease the first cost and possibly extend the life of new and rebuilt track in paved streets?	Are you using automatic door engines to shorten the standing time? Have you installed automatic electric switches to facilitate the movement of
Are you using electric welding in connection with trackwork maintenance, but not carrying the welding to the point that it is more expensive than replacements?	cars and eliminate the delays that aggravate passengers? Are you employing train operation to handle rush-hour traffic or all-day traffic
Are you employing the latest developments in rail joints?	on extremely heavy lines, using motor and trailer or multiple-unit cars?
Have you substituted modern machine tools for obsolete tools, and improved methods in the shop department.	Are you using automatic couplers to save time at the terminals, to reduce maintenance costs on inter-car connections and reduce hazard to trainmen?
Are you conserving the time of shop labor, of track storage yard labor, and the storeroom help by use of proper material handling equipment?	Are you using automatic slack adjusters to minimize inspection and brakeshoe wear?
Are you using an energy-saving device to reduce power bills, maintenance bills, and improve the general handling of cars? Are you deriving the saving in energy possible from the use of thermostatic	Are your cars cleaned periodically, other than merely swept out at night? Have you made use of improved metals for bearings in brake rigging and truck parts?
control of electric heat in the cars? Have you looked into the savings possible from inspection of cars on a kilowatt-hour basis, particularly as against a periodic inspection, but also in comparison with inspection on a mileage basis?	Are you using anti-freeze devices to eliminate pull-ins and delays due to frozen air? Have you made operation at railroad crossings safer by the installation of trolley guards?
Are you utilizing the practice of dipping and baking armatures and field coils to reduce the number of electrical failures? Have you adopted spray painting, together with a fixed schedule for keeping cars brightly painted for the sales value therein?	Have you installed signals to protect operation at dangerous points where the view is obstructed; and also where their application would increase schedule speed and reduce car-hour costs? Have you taken reasonable precautions to avoid damage claims by protecting grade
Have you gone into the reclamation of oil and waste? Are you using electric, thermit and gas welding and cutting equipment in the shop to reclaim worn or broken parts?	crossings with automatic crossing signals? Have you minimized your insurance costs and fully protected your property by co-operating with insurance representatives competent and equipped to advise?

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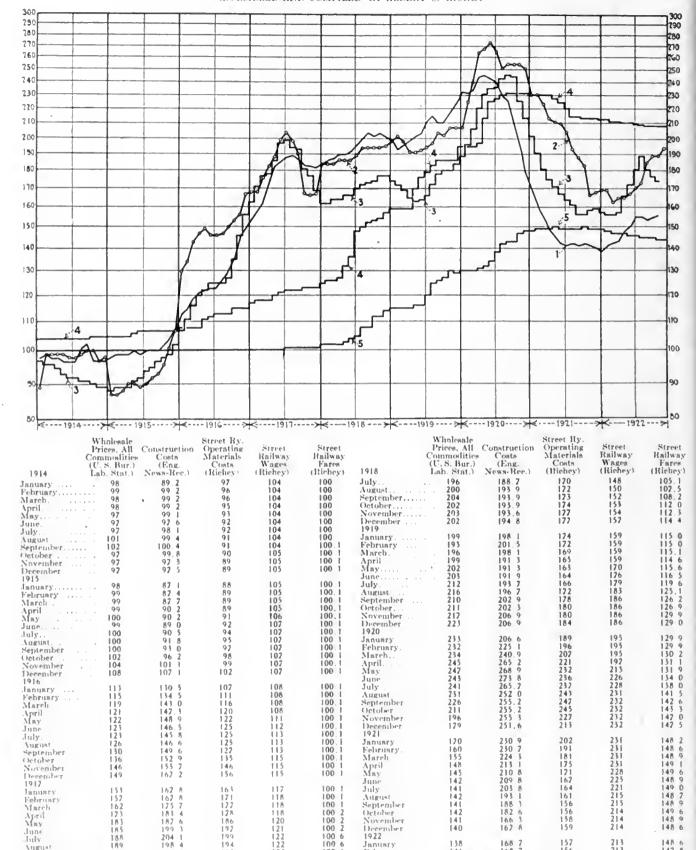
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TABLE AND CHART SHOWING TREND OF PRICES, WAGES AND FARES, BASED ON FIGURES ASSEMBLED AND COMPILED BY ALBERT S. RICHEY



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January February March

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November December

April May

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Trend of Prices, Wages and Fares

These Charts Show on a Logarithmic Scale Variations During the Last Ten Years in Wholesale Prices, Construction Costs and Electric Railway Material Costs, Wages and Fares, as Quoted Monthly in This Paper by Albert S. Richey

URING the past year the "Financial and Corporate" department of this paper has been showing a tabulation of twelve indexes of special interest to electric railway operators under the heading "Conspectus of Indexes," which is assembled (and in part compiled) each month by Albert S. Richey. In the issue of June 24, 1922 (page 995), a chart was presented showing the trends of five of these indexes from the beginning of 1914 down to that date. A similar chart is published herewith in which the various indexes have been extended to include the latest data available at this time. The chart is drawn with each of the indexes to the scale of its average value during 1913 equaling 100 as a base.

It will be noted that the chart as presented in this issue has been drawn to a logarithmic or ratio scale. thus giving a more accurate picture of the trends of the various indexes. While most of the readers of this periodical are undoubtedly familiar with the advantages of plotting such charts on logarithmic scale, the principal advantage of use of such ordinates might be mentioned, namely, that it brings out more clearly a constant ratio of change than does the ordinary arithmetical or uniform scale chart. As an illustration, it will be noted that the distance between the ordinates representing indexes of 100 and 120 (a 20 per cent increase) is exactly the same on the logarithmic scale as that between those representing 200 and 240 (also a 20 per cent increase). If the chart had been plotted to a uniform scale, the distance between 200 and 240 would be twice as great as that between 100 and 120, although the percent of increase is exactly the same.

HOW THE RAILWAY INDEXES ARE COMPILED

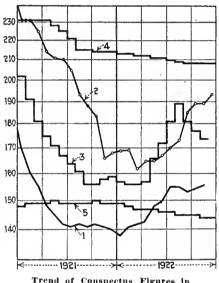
The three indexes compiled by Mr. Richey personally have to do particularly with electric railway operation, and are those of operating materials costs (No. 3), street railway wages (No. 4), and street railway fares (No. 5).

Mr. Richey's index of street railway operating materials costs is a combination of three of the price indexes of the U. S. Bureau of Labor Statistics, namely, metals, lumber and fuel. These three indexes are weighted in such a manner as quite fairly to represent the general country-wide price level of the materials entering into the normal operation and maintenance of the average street railway, including fuel for power. It will be noted that this index maintained its lowest level fairly constantly from August, 1921, through April, 1922, but increased about 20 per cent to a high point in August, 1922, since which time it has been slowly receding.

The index of street railway wages (No. 4 on the chart) is compiled by Mr. Richey by a calculation of the weighted average of the maximum hourly rates of conductors and motormen on 105 street and interurban railways in the United States, each operating more

than 100 cars, the rates of the various companies being weighted according to the number of cars operated. This index reached its high point very soon after the peak of general commodity prices in 1920, and while it showed some decline during 1921, it has been receding more gradually than have any of the commodity price indexes.

The index of street railway fares (No. 5) is also compiled by Mr. Richey, and is the relative average of



Trend of Conspectus Figures in the Years 1921 and 1922 street railway fares in all United States cities having a population of 50,000 or more (except New York City) and weighted according to population. The chart shows very clearly the fact, of which readers of the ELECTRIC RAILWAY JOUR-NAL need no reminder, that street railway fares began to advance only after more than two years of the advance in all

other commodities, and further that the advance was not nearly so great in fares as it was in any of the other commodities listed.

The weighting of the three indexes above described was determined upon by Mr. Richey after very careful investigation and direct information from a large number of companies, and the indexes have been checked against the operating results of both large and small companies at various times since the first publication of the indexes over two years ago. It is believed that they very correctly show the general trends of the three items of operating materials, wages and fares.

THE BASIS OF THE OTHER INDEX FIGURES

The wholesale prices of all commodities (No. 1 on the chart) are shown as compiled by the U. S. Bureau of Labor Statistics, and are as revised by the Bureau during the summer of 1922. This revision consisted of, first, the regrouping of commodities and the addition of a considerable number of new articles, and second, the use of the 1919 census data for weighting purposes in place of the 1909 census data formerly employed. A comparison with the chart shown on page 995 of the issue of June 24, 1922, will show the extent to which this revision changed these index numbers as compared

with those sent out by the bureau prior to June, 1922. The new series should of course be a more reliable indication of the trend of wholesale prices than the old.

The Engineering News-Record construction cost index (No. 2 on the chart) is based on the cost of structural steel, cement, lumber and the average price of common labor in about twenty cities, weighted as described on page 996 of our issue of June 24, 1922. It should be remembered that this index does not include the price of brick, sand, gravel, crushed stone and other materials

locally produced, but intends only to show an index which portrays nationwide trends.

For the benefit of those who want to study the last two years only, a section of the larger chart, including only the years 1921 and 1922, but drawn to a larger scale, so that the various points may be read more closely, has also been prepared and is published.

A tabulation of the five indexes showing their numerical values by months from January, 1914, through to the latest dates available is also published.

Money Is Cheaper than It Was a Year Ago and the Prospects of Financing at Lower Rates Are Better, but the Investors Are Still Chary and Companies Seeking Loans Must Be Prepared to Prove Their Case

Prospects for Electric Railway Financing in 1923

By C. E. Morrow

HERE has been a noticeable improvement in the feeling toward electric railway securities in general during the past year and this improvement will, in all likelihood, continue in 1923. It can be attributed principally to improved railway earnings, and also to the fact that there has been a much improved money market in which railway securities have shared, but not in the same degree as other public utility securities. In the absence of any significant change in the economic outlook, it may reasonably be expected that electric railway and electric light and railway companies may look forward hopefully toward doing their 1923 financing at current rates and perhaps better.

The improvement in earnings is the result of:

1. Changed economic conditions which have brought about an opportunity for reduced operating expenses.

2. More sympathetic consideration of railway problems on the part of the general public and a seeming disposition on the part of regulatory bodies to grant relief to traction properties that will enable them to work out of the difficulties with which they have been beset in recent years.

The evidence of better earnings is conclusively shown in the large numer of traction bonds that have been removed from the list of defaulted obligations, referred to again later.

In many instances long-deferred fare increases have finally brought about larger gross revenues. The Boston Elevated Railway has profited, too, by the introduction of special 5-cent fare routes without transfer, which have brought in considerable revenue that would have been lost under the regular 10-cent fare. But larger gross revenues would have availed little if operating expenses had not at the same time shown a general decrease. The improved net earnings, therefore, must be ascribed to those economies that have reduced the costs of doing business. Among these economies are the more general adoption of lightweight cars equipped for one-man operation; the use, as in Boston, of three-car trains with multiple control on heavy lines; reduction in costs

of railway materials, supplies and equipment; reductions in wages to car operators and service employees; reduced costs of power, and the more general elimination by the roads of the second blue uniform man on passenger cars.

The public has come more and more to realize the unfairness of the wild jitney operation that has taken away not only the cream of railway revenues but in many cases also the milk. There can be no doubt that it is unfair to permit unlicensed and irresponsible jitneys to compete with the railway properties, which are obliged to establish themselves on a permanent basis and to operate under strict regulation of public authorities. In many cases the number of jitneys has been reduced, the territory restricted and operations limited to certain streets not used by the railways.

The ease in the money market is reflected in the downward trend of interest rates. Evidences of this are the advances in prices of Liberty bonds from the low 80s in 1920 and 1921 to around par at the present time. General market municipal bonds have advanced in price during the same period so that the income yield is approximately 1 per cent less than it was only a short time ago. Prime first mortgage 5 per cent bonds of long-established and stable electric light and power companies are now selling for long maturities at income yields varying from 5 to 5½ per cent, compared to yields of around 7 per cent and higher in 1920 and the early part of 1921. The market for public utility bonds showed such improvement in 1922 that a great many high rate bonds were called for redemption, frequently at high premiums, and replaced with lower rate longterm issues. There probably will be more of this refunding at lower rates in 1923.

The extent to which certain railway companies shared in the improved murket conditions is instanced in the case of the Springfield (Mass.) Street Railway. This company found it difficult in 1920 to sell \$330,000 of refunding and general mortgage bonds bearing 7 per cent interest and maturing in 1940. During this past

fall, however, it sold \$2,134,000 of 6 per cent bonds, also due in 1940 and secured under the same mortgage as the 7s. The price at which the bonds were offered was slightly under par to yield about 6.30 per cent. The bonds were not eligible for savings banks in any of the New England states and the important savings bank market was not available. Nevertheless the bonds were quickly sold throughout the New England states.

There is much encouragement to be found in the number of traction bonds, heretofore in default, on which interest payments have been resumed or on which defaults have been removed as the result of reorganiza-Among these are \$2,241,000 Atlantic Avenue Railroad general 5s, \$2,000,000 Brooklyn City & Newtown Railroad consolidated 5s, \$1,987,000 Coney Island & Brooklyn Railroad consolidated 4s, \$4,821,000 Des Moines City Railway general and refunding 5s, \$6,118,-000 New Orleans Railway & Light refunding and general 5s, \$4,200,000 Ohio Electric Railway first and refunding 5s and \$2,927,000 second and general 5s, \$4,708,000 Rhode Island & Suburban first mortage 4s, \$4,500,000 St. Louis & Surburban general 5s and \$2,000,000 consolidated 5s, \$3,685,000 Spokane & Island Empire Railroad first and refunding 5s and \$9,000,000 United Traction & Electric first mortgage 5s.

There is a long list of traction bonds still in default. Figures corrected to November, 1922, indicate that there are some seventy-nine companies doing a public utility business (not including steam railroads) that have one or more bond issues in default, amounting in the aggregate to more than \$364,000,000. Of these companies sixty-eight, or 87 per cent, are railway properties, in which are included a few small companies which also do an electric light and power business. The bonds of these latter companies which are in default aggregate some \$348,000,000, or 95.5 per cent. It is hoped that 1923 earnings will show such improvement that some of the defaults can be removed. The Brooklyn Rapid Transit Company, with considerably more than \$92,000,-000 in default, is one of the companies on which high expectations are placed. The Kansas City Railways with more than \$29,000,000 in default is another property that appears to be working out of its difficulties.

SALE OF NEW SECURITIES TO CUSTOMERS

Many electric light and power companies, and in some instances combined lighting and railway companies, have been successfully selling preferred stocks in small lots to a large number of their customers. It has not been infrequent to find that this wide distribution has been encouraged by selling stocks on the installment plan. The local stockholder is a strong credit asset. Sales of such securities direct to the public will undoubtedly enhance senior financing because they produce a situation that is wholly desirable. The benefits are more far reaching than the supply of new money which results. The gain from the intangible good will and friendly interest and support shown by such stockholders is considerable. It is hoped that electric railways will soon be in a position to interest their local customers in a similar way. There can be no doubt that public utility properties under efficient private management with reasonable public regulation and a large number of local citizens financially interested present a highly favorable investment possibility and would seem to approach an ideal combination for public service.

While the feeling toward electric railway securities in investment markets has improved, that does not mean that all traction properties that could not sell their bonds in 1922 will, somehow, in 1923 find new money flowing into their treasuries. It does mean that investors will be more inclined to be interested in railway securities of real merit than heretofore. In the last analysis, of course, each property coming into the market for new money will have to stand on its own feet. While bankers will want to know about the extent of physical property, its condition, present earnings and anticipations, they will also want to be satisfied on numerous other points, such as, "What is the state of the public mind in the territory served?" "What are the prevailing economic conditions?" "Are jitneys condoned or encouraged?" "Is the railway management harassed by petty governmental interferences or restrictions?" "Is there strong general desire for municipal operation or ownership?" etc.

The railways must not delude themselves about traction bonds. They are still generally shunned in investment circles. No other type of public utility is so open to general attack. It has continued to be popular sport by ambitious politicians to go after the "traction interests," and far too frequently the pollticians have found sympathetic audiences. We are continually reading about rate controversies with judgments appealed from court to court, confiscation of property, wage disputes, jitneys, public operation or public ownership. All of these things are disquieting. Is it any wonder that the investor proceeds with caution when offered traction bonds?

It is not uncommon to find in circulars describing bond issues of electric light and power companies emphasis made of the point that the companies have been divorced from traction business. In circulars describing the bonds of combined electric light and street railway companies the high percentage of earnings from electric business is usually pointed out. The inference is that electric earnings are ample to meet the total charges on the property, even if railway earnings are small or should in the future show a deficit. The statements are intended to answer the questions which investors frequently ask, such as, "What is the extent of the traction interest in the business?" and "How largely are the company's earnings dependent upon railways?"

New traction bond issues that may be brought out during 1923 are almost certain, in the great majority of cases, to bear a minimum interest rate of 6 per cent. Most of the offerings will very likely bear higher rates and all will undoubtedly be offered at a discount, thus making the income yield larger than the interest rate. The day of the 5 per cent traction bond has not returned and its approach seems still in the distant future.

How many railway operators can say that they have exhausted all the possibilities of improved service, of increasing net earnings, of educating the public to know the intricacies and difficulties of railway operation, and of enlisting the public's co-operation and good will? It ought to be clear to all that a strong, healthy traction property is a distinct asset to a community. Conversely, a broken down and defunct property is frequently a disappointment, sometimes a disgrace, and always a matter of concern. In order to increase the respect for electric railway securities in investment centers and to secure the interest of investors in rehabilitation of broken down properties it is essential that the earnings position be strengthened and stabilized and the good will and hearty co-operation of the public be secured and held.

Credit Conditions of Electric Railways Are Improving

Prospects Appear to Be Good for Borrowing by the Electric Railways at Moderate Rates Unless Some Economic Change Now Unforeseen Should Develop

NE thing is certain. The credit situation of the electric railways is considerably improved over that of a year ago. President Todd of the American Electric Railway Association, in his speech at Chicago, made a point of this fact. John A. Prescott, chairman of the committee of public service securities of the Investment Bankers' Association of America, has said the same thing of the utilities as a whole. Mr. Prescott, looking at the matter from the standpoint of the banker who sells direct to the public, said at the meeting of the bankers at Los Angeles that during the past two years there had been a marked improvement in the demand for public utility securities, which, coupled with declining rates, has resulted in a broader market and higher prices.

Such recovery as has been made must be judged in the light of conditions of the past. There is no blinking the fact that so far as electric railways are concerned their credit was at one time well-nigh destroyed. The record of the utility defaults as reported by the Wall Street Journal in November totaled \$349,648,000 for the electric railways alone, but of this amount \$200,-000,000 was represented by the railways of New York City, showing plainly the effect of insistence on the 5-cent fare. It is a sad record, this, but the reason for it is not far to seek. It is found very largely in the frightful increase during the war-time period of the cost of everything entering into the operation of the railways and the slowness of appreciation on the part of regulating bodies of the need for prompt action to secure greater revenue for the lines. Mr. Richey's index of street railway fares shows that the average in 1913 was 4.84. Only very slight increases show in this respect prior to May, 1918 when a fairly uniform

appeared. In one instance at least recently has an investment banking house, though not at the time offering any specific railway issues, advertised its faith in strictly railway issues. This house was Bonbright & Company. It ascribed its faith in such issues to:

- 1. The reduced cost of materials.
- 2. Reduction of labor costs.
- 3. Increased fares.
- 4. Partial elimination of uncontrolled jitneys.
- 5. Marked economies in operation.
- 6. Improvements in public relations.

The analysis of the situation which this company prepared at that time was published substantially in full in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 5, 1922, page 197.

But this is not the only instance in which faith has been expressed in the traction securities by investment bankers. In the preparation of this article expressions of opinion were solicited from members of leading investment houses scattered over the United States, and they are unanimous in their sentiment that the credit situation and the financial outlook for the electric railways have improved during the last year. The change is pretty generally ascribed by the bankers to a combination of the general downward tendency of interest rates and to the improved condition of the industry. Agreement was not so general, however, over the question of whether it might reasonably be expected, in the absence of any significant change in the economic outlook, that the electric railways or combined electric railway and light companies could look forward to doing their 1923 financing at current rates or perhaps hetter. In some cases the opinion prevailed that the railways would be able to do their financing on a better

basis in 1923 than during the past few years, but others felt that the railways must still prove their right to cheaper money. The bankers replying were not all of the same opinion on this point, even in the case of combined railway and light companies. Some seemed to think that these companies were already doing

as well in the money market as might be expected, while others thought that the rates for such companies might go even lower. On one point, however, all were in agreement. That was to the effect that any company which widely distributes preferred stock among the public that it serves automatically presents a certificate testifying to efficiency and the ability to handle public relations problems satisfactorily.

A representative of one of the largest investment banking houses dealing in public utility securities was emphatic in the position that he took to the effect that the credit situation of the electric railways improved

COMPARATIVE	STATEMENT	OF PUBLIC	UTILITY	FINANCING

Eleven Months Ended		1922			1921	
Nov. 30	New Capital	Refunding	Total	New Capital	Refunding	Total
Long term bonds and notes. Short term bonds and	\$414,476,539	\$198,894,661	\$613,321,200	\$313,739,000	\$93,986,000	\$427,725,000
notes .	18,245,000			23, 172, 000		59,995,000
Stocks						119,761,870
Total	4665,014,609	\$245,462,286	\$910,476,895	\$468,315,590	\$139,166,280	\$602,481,870

rise started, reaching its high point of 7.24 in May, 1921. Since then there has been a decline to 6.96 at present. Even at the last-mentioned figure the rise over 1913 has been more than 40 per cent.

As a matter of fact so bad did the credit situation of the electric railways become that, as Mr. Morrow points out in his article elsewhere in this issue, it was not infrequent two or three years ago to see in investment advertising of utility issues the statement that the property of which securities were being offered dld not include any electric railway lines. It has been a long while now, however, since the last of these ads

during 1922. As proof of this he said that some railway financing had been done during the last six months of 1922 that could not have been done during the first six months. While the amounts were not large, they were indicative of an improved condition. The opinion of his house was that this was due to a combination of the general tendency downward of interest rates and to the improved conditions of the electric railway industry. According to this authority a combined electric railway and light company should have no difficulty in doing its financing this year, provided the electric railway was not a liability, but in the case of a compan. doing only a railway business, the prospective buyer of the security would have to be tempted by the price as well as the security itself. His opinion was that customer ownership of stock has done more to strengthen the public utility situation and actually to save it than anything else that could have happened. In this connection the criticism was offered that the utilities blundered during the last twenty-five years by their willingness to pay for extensions and additions by the creation of various forms of indebtedness. The tendency has been to do too much borrowing. This is being corrected, however, by the growing realization that a partner is a much better associate than a creditor. In short, as this authority sees it, the traction situation has improved, many individual cases have been straightened out and the credit situation of the electric railways is better than it was, but a good many problems remain to be solved.

GENERAL CONDITIONS IMPROVED

Of course the factors that affect the operation of the electric railways are largely the same as those that govern the ordinary lines of business, but the freedom of action is not the same. True, the reduction in the cost of labor to the electric railways has been only 10 per cent from the peak, but a good deal of the hazard has been removed from electric railway work by the "decasualization" of labor so that the turnover has been reduced considerably, a factor which has made for economies in other directions.

The jitney situation is greatly improved, although the bus as a competitor has loomed large in other directions, but this will be self-corrective, as the laws of twenty-three states now provide for the regulation of motor vehicles, used as common carriers, and the prospects are that regulation of this kind will be extended in the future. In fact, such regulation will be a subject before many of the legislatures now in session. Public relations are certainly greatly improved over the old days. Perhaps the most important point in this connection is that the battle has been won for recognition of rights of the utilities to a living rate of return. New laws and court decisions have placed the railways on firmer grounds and established in many cases rates that insure a reasonable return on invested capital.

All these things have worked to restore confidence in electric railway securities. Of course, money rates have declined materially from the extreme peak of the war-time period, but that fact alone does not explain the ability of the utilities to do their refinancing during the past year on terms fairly favorable to them. The companies went into the market in competition with other bidders in all lines, and a survey of recent offerings shows the respect with which investors now regard the utility issues as compared with some of the industrials. Bankers report their shelves pretty

well swept of such issues. As for stock issues, there have been many notable sales during the past year direct to utility customers, with more in prospect for the coming year. Such sales are in direct line with the advice given by the banker speakers at the 1921 meeting of the American Electric Railway Association. They introduce an element that has had a stabilizing effect on the other security issues.

MANY SALES OF STOCK TO CUSTOMERS

In these sales of security issues direct to the general public the better credit situation of the electric railways was reflected. Two typical cases are those of the Milwaukee Electric Railway & Light Company and the Public Service Corporation of New Jersey. These are combined properties. In 1921 the Milwaukee company borrowed from home investors through an issue of 8 per cent preferred stock, while in 1922 it successfully disposed of a similar issue with a dividend rate of 7 per cent. The 8 per cent issue is now at a premium of 10 per cent above par. This quotation of 110 is the callable price. The experience of the Public Service Corporation has been similar. Extending over from 1921 to 1922 it sold to local investors in the territory which it serves an issue of 8 per cent preferred stock. The quotation for this issue is also well over par. So confident is President Thomas N. McCarter of the position of his company that he recommended that the stockholders give up the privilege of redeeming the issue at 110 per cent of its par value and also recommended to them that they change the dividend provision on the remaining authorized but unissued preferred stock to 7 per cent instead of 8 per cent. With the redeemable feature removed, he sees still higher levels for the 8 per cent preferred issue, while he is confident of his ability to dispose of a 7 per cent issue locally at or about par. The last quarterly dividend on the common stock of this company was at the rate of 8 per cent a year. Aside from the sale of this stock locally, the company has scored another stroke in bettering its public relations by announcing a cut in power rate.

These are among the most notable examples of the sales of preferred stock to employees and consumers. but there were many others. Among them were the Bangor Railway & Electric Company, Columbus, Delaware & Marion Electric Company, a reorganization of the Columbus, Delaware & Marion Railway; Interstate Public Service Company, Pacific Electric Railway, Portland Railway, Light & Power Company, and the West Penn Railways. One or two of these companies report that it is difficult to say what effect, if any, customer ownership has had on public relations, as there has been no occasion for a real test, but others are agreed that customer ownership has had an important influence in bettering public relations. As for the cost of such sales, it has varied from \$2 per share to as much as \$12 per share. The average cost of selling issues for which figures are available was \$6 per share. In this connection, however, it must be borne in mind that in most of these cases the issue was disposed of locally at a better basic price than could have been secured in the open market for a bid of none or all. Moreover, it usually costs more to dispose of a smaller issue than one not too large. These data all relate to the companies mentioned, but these companies do not represent all the utilities, either railway or combined railway and light companies, that have sold stock direct to the public. There were the notable examples, previously cited, in Milwaukee and New Jersey, and in addition there were offerings by the Gary Street Railway, the Northern Ohio Traction & Light Company, the Pennsylvania-Ohio Electric Company, the Tri-City Railway, the Iowa Railway & Light Company and others.

This tendency to cater to the small investor has not been confined to the sale of stock issues. The baby bond has come to be a real factor; in fact, much more of a factor than is perhaps generally realized. The war opened the eyes of the investment banker to this field of operation. In the case of utility and industrial bonds, it has been found that the small investor is very often the long holder. He has a great deal more investment sense than he ordinarily receives credit for having. In proof of the growing magnitude of issues put out in small denominations the Wall Street Journal has recently published several lists of \$100 bonds. One of these contains about 204 utility issues, covering gas, telephone, electric light, electric railway and the issues of companies that combine two or more of these activities. Of this number thirty-three were of straight electric railway issues or combined light and power issues.

After all, however, the matter of credit reduces itself to the individual company. There is of course a mass trend to the money market. Money is relatively cheap or it is dear, but the borrower secures additional capital within the range of current prices at a relatively low or high figure compared with the spread of prices. in conformity with his credit standing. An example or two will suffice to point a moral. Money rates were low last year, as compared with the war-time period, but it took a combination of a good credit rating and seizing of opportunity to complete these transactions. Thus, as a result of putting out an issue of refunding

and first 5 per cent bonds, one combined utility was able to call \$4,950,000 of $7\frac{1}{2}$ per cent bonds issued during the money stringency of 1921 and in addition to redcem approximately \$3,000,000 of additional funded debt bearing a high rate of interest. In the absence of direct information and allowing for possible premium and discount on the old and the new issues, the saving in yearly interest charges, in this particular case is probably somewhere near \$100,000. Earlier in the year the Columbus Railway, Power & Light Company arranged to call \$3,00,000 of 8 per cent bonds outstanding, with a saving of \$41,000.

These are of course isolated cases. There fell due in 1922 \$160,015,860 of railway or combined railway and light issues. As money, in a sense, went begging in the early part of the year a number of companies anticipated their maturities. A good deal of the refunding carried out was of short-term issues carrying interest rates in many instances as high as 8 per cent. On the other hand, many long-term issues fell due that had been placed at coupon rates as low as $4\frac{1}{2}$ per cent. It is impossible under the circumstances even to hazard a guess as to whether as a whole on the basis of last year's refinancing the fixed charges of the railways and the combined railway and light properties were materially reduced. In this connection the figures for the new year are significant. From the record of maturities as compiled by the Woll Street Journal the accompanying summary covering the railway and the combined railway and light properties has been prepared. It shows that there are only \$94,851,800 of such maturities in 1923, or a little more than half the amount falling due in 1922. This in itself is a very helpful factor for the new year.

For the eleven months ended with November the total

STV	ГЕМ	ENT OF PR	INCIPAL ELECTRIC RAILWAY	MA	TURITIES C	COMING DUE IN 1923	
January			May			September	
Corporation	Rate	Amount	Corporation R	ate	Amount	Corporation Rate	Amount
Ohio Traction notes	7	\$1,878,000	Commonwealth Pr., Ry. & Lt notes	7	250,000	Scioto Valley Traction Co. 1st 5	1.426,000
Lake Shore El. Ry cons	3	1,630,000		6	250,000	Southwest Missouri Elec, Rv. ref 5	1.150.000
Jackson & Battle Creek Tr. lst	5	1,200,000				Binghamton Railroad 1st 5	462,000
West End Street Railway Ist.	43	700,000	May total		\$500,000	Webb City Northern Int. 5	200,000
Charleston City Railway 1st	. 🦫	680,000	Inne			Louisvile & So. Indiana Tr. Co. Ist 5	1,000,000
Milford & Uxbridge St. Ry. 1st	. 5	335,000	Quebec, Montmorenel & Charlevoix				
Eastern Massachusetts St. Ry Jamestown Street Railway Ist	6	300,000	Ry Int	5	2,500,000	September total	\$4,238,000
Jersey City & Bergen R R. Int	41	300,000 238,000	Lehigh Traction Co. 1st	5	500,000	October	
Interurban Railway deb	- 73	250,000	Lowell, Lawrence & Haverhill St.			United Rys. of St. Louis rec. cert. , 7	4,200,000
Webster, Monessen, Belle Vernon		230,000	Ry. Ist	5	479,000	Cass Ave. & Fair Grds Ry. Ist 6	1,640,000
Fayette City Street Railway	. 6	250,000	Portsmouth, Dover & York By. &			Eastern Wisconsin Ry. & Lt. 1st . 5	1,182,000
Oskalonaa Traction & Light Co. lat		216,000	Light Co. let	41	299,000	Clev., Painesvie & East, R.ll. cons. 7	1,131,000
	-		W. Penn. Trac & Wat. Pr. Co. notes	-	299,000		500,000
January total		\$7,997,000	June total.		\$4,228,000	Dayton, Springfield & Xenia So. lat. 5 Scranton & Pittaton Traction lat. 6	426,000
February					34,220,000	Blue Hill Street Railway lat. 5	295,500 250,000
Brooklyn Rap Tr receivers' cert	. 6	14,000,000	July	-		Christopher & Tenth Street Ist 4	210,000
Cleveland, Southwestern & Col. Ry		1,400,000	Monongabela Valley Trac. gen Comp. Hts., Un.D. & M. term. 1st	(6,615,000 986,000	I The state of the	210,000
Ind., Col & So Tract Co Ist	5	932,000	Lehigh Valley Trana collateral trust	7	924,200	October total	\$9,834,500
Saginaw Valley Traction 1st	5	584,000	Bridgeport Traction 1st	3	706,000	Vorember	4 .,02 .,300
Canton-New Philadelphia Ry. 1st	5	565,000	Northern Illinois Light & Trac. lat	3	668,000		3,600,000
Montgomery Street Railway lat.	6	150,000	Ningara Falls & Susp. Br. Ry 1st.	6	500,000	Milyale, Etna & Sharpsh lat 3	741,000
			Oklahoma Pr & Transport notes	h	129,000	, , , , , , , , , , , , , , , , , , ,	741,000
February total		\$17,831,000	Pittsfield Electric Street Ry. Ist	4	300,000	November total .	\$4,341,000
March			Wisconsin Gas & Elec Co notes	6]	300,000	December	
Ind & Northwestern Tract Co lat		2,470,000	Winnipeg, Selkirk & Lake Winnipeg			Washington Railway & Elec. gen. 6	1,000,000
Danville, l'Ibana & Champaigi	1		Ry let	5	400,000	Federal Light & Traction notes. 7	947,000
Ry Ist	2	2,000,000				Fortgraf Light & Transion mutae	715,000
Eastern Wise Elec Co notes Olso Central Traction cons	- 5	1,200,000	July total		\$11,728,200	Hagerst, & Frederick Ry. I-yr. notes 71	540,000
Kentucky Utilities deb	,	180,000	August				
rentucky Cultures den	0	100,000	Boston & Worcester Street Ry 1st	41	2,460,000	December total	\$3,202,000
March total		\$6,355,000	Bloomfield Street Railway 1st	5	230,000		
Lord		401111000	4		4 2 2 1 0 000	Railway notes and bonds maturing in	1
Tri-City Ry & Lt Co elt		6,696,000	August total		\$2,710,000		\$7,997,100
Detroit United By notes	ź	4,300,000				February March	17,831,000
St Louis & Suburban Ry gen	1	4,500,000				April	6,353,000
Wilmington & Chester Tract Co	6	2,303,000				Viny	21,887,000
Springfield Street Railway Ist	4	1,700,000	As indicated in the acc	om	nanvine	June	500,000
Denver Tramway Power Imp	5	836,000	text, this total of \$94,851.			July	4,228,000 11,728,200
Holyoke Street Railway deb	- 5	265,000				August	2.710,000
Evansville & Princeton Tract 1-t	5	260,000	turities for the year 1			September	4,238,000
Laneaster Traction 1st	- 3	223,000	striking contrast to the	. (otal of	October	9,834,500
Citiaens Elec. Hy , Lt. & Pwr. cons.	3	200,000	\$160,015,860 of maturitie	29.62	for the	November	4,341,000
Juliet Railroad general	5	400,000	venr 1922.	4.		December	1,202,000
April total		\$21,887,000) till 1556.			Constant	to the sales day
shin ioini		#41,00#,000				Grand total	\$94,851,800

of all utility financing as reported by the *Commercial and Financial Chronicle* was \$910,476,895. This includes of course all utilities, among them gas compaines, telephone companies and water companies. For the entire year the *Electrical World* reports the financing for the electric light and power companies and combined electric light and railway companies at \$589,960,990.

On this matter of statistics it is recognized that there is a need for comparable figures going into greater detail than those now ordinarily available through the usual financial channels. The newspapers and financial journals make a good job of the work which they attempt, but after all they are essentially newspapers and there are limits beyond which they cannot go. Recognizing this, the Investment Bankers' Association of America, through its committee on public service securities, is planning to keep a complete record of financing activities in the public utility field, according to a recent announcement. To this end, Henry R. Hayes, chairman of the public service securities committee of the association, has sent out a letter to all the members of the organization, urging their co-operation in this The work of the committee includes, connection. among other things, keeping in touch with the requirements of utilities, securities offered for sale, and legislation affecting the securities offered.

Reference has been made previously to the trend of the bond market last year. That is by no means a criterion by which to judge accurately probable movements for 1923, but in referring to the prospects for the coming year the National Bank of Commerce says that the two major causes which explain the movement of the bond market during 1922 are of great significance in relation to its probable course in 1923. During the last twelve months that market passed through three distinct phases: a rapid advance, a period of relative stability with a moderate upward tendency, and a period of moderate decline. The upward swing which began in midsummer of 1921 was unchecked, save for temporary and quite unimportant recessions, until June, 1922. This advance was more rapid and persistent than any recorded in recent financial history. All classes of bonds shared in the gains, and prime securities were brought back to what would have been an average yield before the war, if some allowance is made for the altered tax situation.

During the period of rapidly advancing prices new offerings were very heavy. The approximate total for the ten months ending with October was \$4,700,000,000, which amount included refunding of old issues. Of the total \$3,180,000,000 was offered from January to June. For a time, because of expectation of advancing prices, new issues were bid for eagerly, in some instances at prices to yield less than the investing public was anxious to accept.

From July until autumn the undertone of the market was firm and the various averages of bond prices continued to advance, although more slowly. The strength of good investment issues was especially marked. During this period interest in new issues flagged. The market had definitely lost the enthusiasm prevailing during the earlier months of the year. The downward movement began in September and it was unchecked until the first week of November. Since that time the market has moved irregularly and through a very narrow range.

As a result of general business unsettlement in 1920

and the earlier months of 1921 many excellent bonds had declined below what they were worth for permanent investment. This situation was certain to be corrected as soon as business stability was regained.

The second factor of change in the money market was the purchase of bonds with funds ordinarily employed in commercial and industrial enterprises. During the long period of liquidation many businesses accumulated funds which were not immediately required for their current operations. In the interim it was necessary to employ this money, and many turned to the bond market, at first because the yields on many issues were very attractive and later because of the expectation of profits on a rising market.

Bonds bought for temporary investment were certain to come back on the market sooner or later, and under these conditions the market was also peculiarly sensitive to money rates. Declines in prices during the autumn months have been due in considerable measure to this situation, but they have been moderate, and it seems probable that the further elimination of this speculative element from the market will be so gradual as to have in itself little further effect.

As the banking authority previously quoted sees it, in 1923 the general business situation will exert only its ordinary influence on the bond market. Stable business ought to be reflected in a corresponding stability in good securities. Political conditions will continue to be the dominant factor for some foreign bonds and money rates will exert their customary effect upon the course of security prices. It seems probable that for the first time since 1914 the American bond market will again become primarily an investors' market. It will be increasingly discriminating and will be affected to a lessening degree by temporary and speculative influences.

TAX RECOMMENDATION RENEWED

In connection with the matter of future finance, it is of interest to note here that the President in his message to Congress renewed the suggestion that the nontaxable feature of bonds of political subdivisions be removed. This, of course, is in line with the best thinking of the day on the matter. Eventually the goal sought to be obtained by the president will undoubtedly be attained, but just at this time the recommendation is perhaps of greater interest as a manifestation of the growing realization of the evil of the tax-exempt bonds than for any prospect it holds out of the end sought being achieved in the near future.

But where does all this point? It points, unless all signs fail, to bright prospects for the future. Of course, industry has expanded in the last half of the year and commercial borrowers have again come into the market for goodly sums. This has had a tendency to stiffen money rates somewhat, so that they have advanced, particularly to industrial borrowers. All business is hazardous, as the electric railway managers found out, but there are few lines of activity which. taken over a span of years, offer the stability that does a well-managed utility. Having won their case before the courts of law, having in most cases bettered their public relations materially, and having in many cases strengthened their financial structures, the electric railways, it would appear, have every reason to look forward hopefully to financing capital expenditures during the coming year.

Railways Will Spend \$240,000,000 in New Plant and Equipment

1923 Purchases for Modernizing and Producing the Service at Lower Cost Will Be 60 per Cent Greater than in 1922—This Gives a Definite Measure of the Improving Financial Conditions

N ADDITION to the very large normal expenditures that must always be made for materials and supplies to keep the wheels turning, city and interurban electric railways of the United States will spend the huge sum of \$240,000.000 for new plant and equipment during 1923. This is an estimate of the budget of the industry for this year, as far as it relates to the purchase of new plant and equipment, paving, tools, economy devices, etc. These planned purchases for 1923 are practically 60 per cent greater than were the same expenditures for 1922, when the total amounted to some \$151,000,000.

These expenditures will be divided among the three main accounts, as set up in the A.E.R.A. standard classification, as shown in the accompanying table. This gives a very tangible measure of the extent to which the credit and financial ability of the electric railways are coming back. Their returning prosperity has been plainly evident as 1922 wore on and as now shown indisputably in the statistical studies made by this paper and published elsewhere in this issue.

Increases in expenditures planned in the budgets of the electric railways for 1923 show unquestionably that, taken as a whole, the electric railways have turned the corner, their difficulties are rapidly mending, confidence in their future is more solid, and that the quagmire under their securities is certain to be dried out and become firm ground, thus enabling them in the comparatively near future to proceed with the needed expansion on a reasonable basis of financing.

HOW THE FIGURE WAS OBTAINED

In order to determine what the probable expenditures in new plant and equipment would be during 1923, the ELECTRIC RAILWAY JOURNAL requested information from the 107 Class A companies as to 1922 expenditures and what they planned to spend in 1923, both divided as among way and structures, equipment and power. Definite figures were supplied by forty-seven companies, practically all of the remaining companies responding, but either declining to give the figures or stating that they could not tell at this time, or indicating that a budget or the planning ahead of expenditures for the year was not a part of their routine. The figures for these forty-seven companies were summarized and the figures for the entire industry calculated from them, proportionately, based on track mileage and cars operated. Both track and cars were used because neither alone gives a proper measure of the buying power of

the industry. The actual figures supplied by the forty-seven companies totaled as follows: 1922, \$31,200,000; 1923, \$51,800,000; the latter being an increase of 66 per cent over 1922.

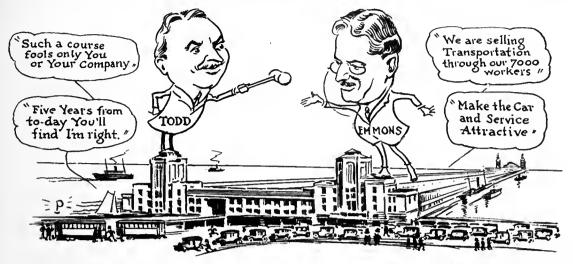
A number of the companies which were unable to give any estimate stated that they were expecting to make large expenditures in rehabilitation work but this was

"ELECTRIC RAILWAY JOURNAL" ESTIMATE OF EXPENDITURES DURING 1922 AND 1923

1922	1923	Per Cent Increase. 1923 Over 1922
Way and structures\$85,000,000 Equipment	\$105,000,000 90,000,000 45,000,000	23.5 137.0 60.6
Total\$151,000,000	\$240,000,000	59.0

contingent upon local political situations. It may be assumed, therefore, that many of these situations will be cleared up and expenditures will thus be made which will offset abnormal conditions that may arise with other companies tending to cut off expenditures. more, several of those that gave figures stated that a much larger amount would be expended than indicated if the money market for their securities showed improvement, or if some political difficulty or franchise matter was settled. Any improvement in such cases would then tend to improve the showing as applied to the entire industry. While some may say that the smaller companies will probably not make expenditures proportional to the larger companies in point of cars and miles of track, there are many small companies which are among the most prosperous. Furthermore, a number of the very largest Class A companies are missing in the figures used as the basis for the industry estimate, and this tends to decrease any over-influence of the large corporations. Also the Journal editors have made allowance in this direction by scaling down to take into account a possible differing situation with respect to the smaller companies. The main reason for approaching only the larger companies was to simplify the work of compilation and because comparatively few of the smaller companies operate on a budget basis.

In looking into the detailed figures it is interesting to note that the largest increase in expenditures during 1923 compared with 1922 will be in the purchase of new equipment. The expenditures for way and structures will lead in 1923 as it did in 1922, but will be only 16 per cent greater than for equipment instead of more than 100 per cent greater, as was the case last year.



"The Attendants at the Convention Helped the Yellow Cab Company Pay an Extra Dividend"

Over the Road with Father Time

By G. J. MacMurray
News Editor Electric Railway Journal

Some Sense and Some Non-Sense Glimmed Out of the Year's News — The Bumps of 1922 Don't Appear So Bad Now That You Have Taken Them

TINA WILCOX PUTNAM is a clever woman. To this introduction every electric railway man is expected to respond promptly. He will if he happens not previously to know that the lady is already married. She has a husband of her own, and in the American Magazine she makes a few remarks about husbands in a most delightful way. In that respect she seems to score visibly over Ring Lardner, to whom was assigned the task of dissecting the ladies. One article was headed "Say It with Bricks"; the other "Say It with Oil." To Mrs. Putnam there is very little that is romantic about a man with shaving cream on his face and his suspenders draped over his hips. loves her husband but she is not oblivious to his shortcomings. The relation of the writer to the electric railway industry is somewhat similar to that of Nina to her husband. He loves it but he sees it too often with its face covered with lather, and its suspenders over its hips, as it were, not to enjoy its moments of unconcern. Thus it was at Chicago.

Aside from the fact that the convention forsook the privately owned stock yards for the beautiful Municipal Pier as the place for holding the meeting, there were other seeming incongruities. For instance, there was a beautiful map of the city got out by the railway association which showed among other things the street car lines that could be used to reach the pier, but if anybody in attendance at the convention other than the writer used these lines, there was no evidence of it. The attendants at the convention, concerned with means of boosting the electric railways, helped the Yellow Cab Company to pay an extra dividend. It was a great convention as far as the cab company was concerned, the greatest of all except one, the cab drivers said, and that was the bakers'. The railway men have the "rubber

urge," as Zenas W. Carter said, but apparently they don't know they are victims of it. All of this may seem trite, but there isn't much that remains to be said about the convention now that the JOURNAL editors have finished discussing the meeting. So much for that.

In the article similar to this which appeared in the JOURNAL for Jan. 6, last year, the writer referred to the statistics elsewhere in that issue being like hash, because most anything could be put into it. All that was achieved by that excursion was to incur the temporary displeasure of the men who worked on these figures, so that the three-hour-for-lunch club among the editors was minus a member for several days. Statisticians are



"The Three-Hour-for-Lunch Club Among the Editors Was Minus
u Member for Several Days"

sensitive beings, it seems. Moreover, they appear to know all the different wheezes that have been got off in the past about them. They were patiently waiting this year for us to come to them and ask: "What do your figures for 1923 prove?" We felt the proud man's contumely once. That was enough.

As Will Rogers says, it is the opening that counts. Having placated both the railway men and the editors

at the start, it ought now to be possible to proceed, whether that be in chronological order, in historical sequence from the most important subject to the less important, or without any attempt at law and order. After all, the important thing in life is salesmanship. Some railway men forgot for a time that this was so. In con-



"Every One Is Wondering Who Put Chocolate Pepperminis in Some of the Girls' Pockets"

sequence a gang of newspaper men is at work for state committees throughout the country trying to get the public back on the right track and Labert St. Clair is busily engaged on a similar problem at the American Association headquarters. This is all good stuff, and it would be nice if as much could be said of all the house organs, but it can't. The contents of most of them are pretty

good, but there is considerable room for improvement. In this connection Robert C. Benchley has made some pointed comments under the title "Effective House Organs" in his book "Love Conquers All." Of course Mr. Benchley exaggerates, but so do all other humorists and satirists. That's where their art comes in. They distort the truth without destroying it. It is easier to quote Mr. Benchley than to paraphrase what he says. As a typical example of house-organ inanity he quotes:

"Every one is wondering who the person is who put chocolate peppermints in some of the girls' pockets while they were hanging in the girls' rest room Thursday afternoon, it being so hot that they melted and practically ruined some of their clothing. Some folks have a funny sense of humor."

Mr. Benchley suggests:

"Perhaps some one will start a house organ edited by the employees for circulation among the bosses, containing newsy notes about the owners' families, quotations from Karl Marx, and the results of the profitsharing contests. This would complete the circle of understanding."

As this is the era of reform, it is to be hoped that the house organ will be next in line to be tackled by the Committee of One Hundred or some other strong organization. To appropriate an expression used by Heywood Broun, some of these house organs are about as effective in their way as it would be for a man to help swell the Niagara current by spitting into the Niagara River.

The sales idea as applied to transportation is sometimes misapplied, but on the whole the industry is reacting favorably in the matter. This has been evident at most of the convention meetings during the year. In this work the weekly pass has been a considerable factor. It furnishes concrete evidence of the willingness of the railway to do something extraordinary for the public. The spread of its use has been remarkable. Moreover, the realization has been growing steadily of the real value of the service performed by the electric railway in the community. Yes, it's true. In a particular case here and there doubt may still be felt about it, but on

the whole it's true. Saginaw may still be without electric railway service, but as contrasted with Saginaw there are the settlements of the jitney question arrived at in Augusta, Toledo, Kansas City, Spokane, Providence and Des Moines to mention just a few. True, the citizens of Augusta were without electric railway service for several weeks, but they appear to have learned their lesson.

Strikes were among the other causes of service suspensions. One of the most bitterly contested of these has been the dispute in Buffalo. The brief Chicago strike discommoded the greatest number of people, but in Columbia, S. C., in the early part of the year there was a strike which so far as a small city is concerned was one of the worst that has occurred for some years. Steubenville, Ohio, not to be outdone by any big city, also had a serious strike. In the Buffalo case it certainly is a strange study in contrast that the man at the head of this property should in Philadelphia be considered as a benevolent chief, while in Buffalo he is regarded as a despot. In Philadelphia the socialization of industry has been pretty nearly made a fact by Mr. Mitten, but in Buffalo, strange as it may seem, the attempt being made to achieve the same footing for the workers is being contested by the so-called representatives of the men.

Everywhere the question has been how to better the service. In New York both the companies operating the rapid transit lines and those running the surface roads fell in with the ideas of the commission as to what should be done and a series of service standards was promulgated based on the growing ability of the companies to meet the demands which it was intended to make upon them. Instead of formal proceedings now, there is a monthly conference at which members of the commission and the officers of the surface lines go over the facts. In Chicago cars have been rerouted in the downtown section. Nashville, Memphis, Atlanta and Kansas City are among the other cities that have gone forward in the movement to better local conditions of service. In this connection the extension of service with oneman cars was extraordinary, as was also the application of light-weight cars to interurban service. At the same time there was a further extension of the idea of de



"The Spread of the Use of Weekly Pass Has Reca Remarkable"

luxe service to the operation of the interurban lines. Thus the Kansas City, Clay County & St. Joseph Railway adopted the chair car idea with excellent results and the Sacramento Northern Railroad has put into commission a luxuriously furnished dining and observation car, which is being operated over the company's lines from Chico to Sacramento and thence direct to

San Francisco, via the Oakland ferry. Under this plan there is no change of cars during the entire 184-mile trip between Oakland Pier and Chico.

Another innovation was the appearance of the turnstile car. The ways in which this device has been worked out certainly speaks well for the ingenuity of

the men engaged in street railway work. At a meeting of railway men a few years ago one of the speakers predicted the so-called push-button car for the future. It certainly looks as if that device were on its way. The subway trains in New York are fast approaching this goal, a great many being operated with only one guard on a train. Operation is becoming more automatic every day in every way. Perhaps M. Coué can suggest the way.

And now apparently this account comes to a direct pause. The subjects which the notes show should receive attention are so diverse that it seems well-nigh impossible to tie them together. It is like committing journalistic hara-kari to admit this, but some one has said that open confession is good for the soul. On its financial side the status of the industry has improved considerably. There is still much left to be desired, but the record of earnings of some of the roads is impressive. Richmond had a surplus of \$990,099, Boston one of \$1,117,621, Eastern Massachusetts an increase in net of \$892,389, Philadelphia a net of \$1,807,-292, not to mention in exact figures the Brooklyn City showing, the Illinois Traction System figures, the Montreal surplus, the Cleveland showing, etc. Money is being plowed back into the properties, too. For instance, in the case of Columbus, Ohio, the sum so reinvested amounted to \$5,043,471 in three years. Even under the receivership in St. Louis \$8,513,000 has been spent in three years. It was more or less of a revelation locally that 17,782 items of supplies had been bought. Incidentally, the speech in which these facts were brought home to his audience was a mighty good piece of better



Money Has Been Plowed Back Into the Ran-Down Properties

public relations work on the part of Colonel Perkins, manager for the receiver.

The home rule agitation was renewed in Indiana, New Jersey, California and New York and the Bacharach bill made its appearance in Congress. Except in New York it is extremely unlikely that the apostles of local control will achieve very much, and even in New York

State the result of any reorganization may mean that it will be put right up to Mayor Hylan to put up or shut up. And while New York is talking subways instead of building them, Chicago is doing the same thing. Again it is politics. This did not prevent one of the JOURNAL editors, Harry L. Brown, from telling Chicago how it



Movie of Mayor Couzens and Fickle Detroit

sought to be done. Speaking before the midwinter convocation of engineers Mr. Brown, like a true editor, differed with about everybody else who has spoken on the subject with respect to routes. Every one will agree with one of Mr. Brown's statements, however. It is to the effect that Chicago is in need of some subway facilities now, and he showed how the construction of a certain small amount of subway would greatly relieve the rapid transit congestion, if tied in with the present elevated system. New York has a \$218,000,000 construction program announced by its state-created Transit Commission as opposed to a subway and bus scheme proposed by its Mayor. And while the representatives of the "peepul" in New York, Chicago, Philadelphia and other cities are quarreling among themselves over what shall be done to increase transportation facilities, over in Paris they have done a great big thing by tying together in one transportation unit the urban and suburban railways, the omnibus lines and even the steamer service. Those among us who are prone to say, "But conditions are different over there," should turn back to the JOURNAL for July 1, page 3. In line with these thoughts is the record of the opening of the Frankford Elevated Railroad in Philadelphia. For more than two years this structure stood in mute silence while the city and the Philadelphia Rapid Transit Company discussed operating terms. It mattered not that the Philadelphia Rapid Transit was right in insisting upon being guaranteed against loss in running this line, the people suffered in the meantime. Anyway, Mr. Mitten succeeded in putting his property back on a dividend-paying basis, after having elected his own slate to the directorate of the company at the annual meeting in February. It had been anticipated that the fight for control would be a great battle. It was, for Mr. Mitten. In a carhouse jammed with employee stockholders Mr. Mitten was entirely at home.

But Mr. Mitten's effort has been no more heroic than the efforts made elsewhere to put properties back on their feet or to keep others from slipping off their feet. The plan for the unification of the lines in New York may never materialize along the lines originally proposed, but the Interborough Rapid Transit reorganization has been accepted and that company apparently saved from receivership. Brooklyn has been building along substantial lines, and there is talk of taking the Brooklyn Rapid Transit Company out of the hands of Lindley M. Garrison as receiver early in 1923. So far as the operation of the divorced surface lines in Brook-

lyn is concerned, they are doing so well under the guidance of Clinton E. Morgan that they have been put back on a dividend paying basis. Through the effective work of President A. W. Thompson, the Pittsburgh reorganization has been approved and only the details remain to be concluded there. In all, the Pittsburgh program calls for the expenditure of \$5,000,000 of new money in improvements. The New Orleans situation has been cleared up and the company there is working under a new basis advantageous alike to both the city and the company. This was due in large part to the efforts of C. C. Chapelle, who represented the security holders' committee of the New Orleans Railway & Light Company, whose success lay in his ability to convince the New Orleans public and city authorities of the truth of four principles. When expressed, they seem axiomatic, but their general acceptance elsewhere would simplify reorganizations greatly. As applied to New Orleans they were as follows: (1) New Orleans needs efficient public utility service. (2) Such service cannot be supplied without money. (3) Money cannot be had from the present company. It hasn't got it; it can't get it. (4) No one can or will supply this money except the investor. After these principles were accepted the adop-



"Thus Times Do Shift; Each Thing Its Turn Does Hold"

tion of an "assured service" plan, fair alike to the company and the city, followed as a matter of almost due course. Speaking of new operating agreements and franchises, there are the new grants in both Louisville and Grand Rapids. There is also the Des Moines grant, referred to before, which the courts have recently sustained and thus settled doubt here. A small coterie attempted to upset all the good work that had been done at Des Moines, but failed ignominiously.

On the other hand, during the year the cities of Detroit and Ashtabula took over the local electric railways. For the road in Detroit the city paid \$19,850,000 in partial payments, so much down and so much every six months. It appears to have been a personal triumph for Mayor Jim Couzens rather than for the municipal ownership idea. It was May 15 that the deal was formally put through. In November the same public that had backed the Mayor refused to listen to the same Mayor's admonition for funds to earry out extensions and improvements which were part of the original plan approved by the same voters. Mr. Couzens wanted to see the thing through, but then came the resignation of Senator Newberry and the call of the Governor to the Mayor to go to Washington. Thus Mr. Couzens became a national figure in a day.

In Detroit the agitation over the local railway problem has helped materially in making a national figure of the sponsor of the municipal ownership

idea, while in Seattle, with the lapse of time, both Mayor Hanson and his successor, Mr. Caldwell, have been returned to private life by a "grateful" public. It will be interesting to follow the acts of Mr. Brown, the present incumbent at Seattle, and see how he succeeds. In deference to public clamor he has arranged to reduce fares from 10 cents cash, or 83 cents at the ticket rate, to 5 cents cash with a 2-cent transfer. Riding will have to increase 46 per cent to pay at the 5-cent fare, so the railway experts say. And yet Seattle isn't afraid. It wouldn't be Seattle if it were. Mr. Erickson, who has had a large hand in the Seattle municipal ownership pie since the pie was first baked, perhaps half-baked, wanted a 3-cent fare. Nobody seems to have stopped to figure out how many passengers would have to ride at 3 cents to make the road profitable, but if the estimate for the 5-cent fare is right, then the population of New York transported to Seattle might help considerably.

Another important work of the year was the campaign for safety. An entire issue of the ELECTRIC RAILWAY JOURNAL was devoted to that subject. Aside from the interview by Harry Brown with Cecil G. Rice, the articles were all written by railway men themselves. Mr. Rice was then president of the Claims Association. Again in the issue of Sept. 9 there was a full page of "Safety Epigrams" by Mr. Rice himself.

So far as meetings of electric railway men are concerned the most important in the order of their occurrence were the annual Central Electric Railway Association meeting on Jan. 26 and 27, the midyear meeting in Chicago on Feb. 28, the annual meeting of the Canadian men in Quebec June 1 to 3, the Central Electric Railway Association boat trip the early part of July and the Chicago convention in October. The annual meeting of the C. E. R. A. was the one at which Labert St. Clair trotted out his renowned cookie jar. Some other very good cookies were also trotted out. It is seldom at a sectional meeting that so many good papers are presented on mechanical subjects. And most fitting of all, the Central men elected Sam Greenland to head At the midyear meeting Mr. Todd explained "What is a Hoosier?" That meeting was attended by more than 700 persons. Mr. Todd said Hoosier was derived from "Who's here?" Well, nearly everybody in the industry was there. It was at this meeting that the novelty was introduced of having a woman address a railway convention. The men who spoke did very well, but on this occasion even the inimitable Mr. Wickwire appears to have been outshone by Antoinette Funk of Washington. On the occasion of the Canadian meeting in June a goodly number of Americans were in attendance. Helical versus spur gearing was one of the topics of conversation, but that wasn't all, indeed it wasn't. The Central Electric Railway boat trip was a stormy meeting in the sense of being a rough trip. The boat, so the writer of the account in the Journal says, got on a sand bar. It was at this meeting with the boat on the bar that certain railway men had the temerity to look into the future as far ahead as 1952. As for the Chieago meeting, reference has already been made to that.

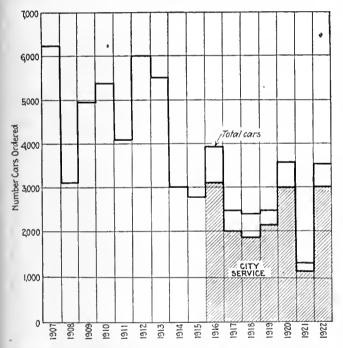
And here the notes are exhausted, and the author, too, but not the subject. If the reader is not by this time exhausted it is only because he sees himself here reflected as a participator in some of the events of which a line or two has been jotted down.

"Thus times do shift; each thing its turn does hold; New things succeed, as former things grow old."

Nearly 200 per Cent Increase in Rolling Stock Ordered During 1922

Pre-War Level Again Reached in New Car Purchases—Passenger Cars Arranged for One-Man Operation Constitute More than 50 per Cent of the Total of New Passenger Cars for City Service

THE year's record of new cars and electric locomotives ordered during 1922 is shown in the accompanying tables. The volume of new rolling stock ordered has again mounted to the levels of 1916 and 1920 and has exceeded other previous records since 1913. The total of 3,538 new cars and locomotives ordered during 1922 is nearly three times that of 1921 and exceeds the yearly average for the previous ten years, which is 3,344. The statistics for new passenger cars ordered during the first half of 1922 as published in the July 1 issue of this paper showed that an excellent start had been made. It is now seen that the number of cars ordered during the last half of the year



New Cars and Locomotives Ordered, by Years. The Division Into City and Internrban Cars Is Not Made Prior to 1916

is more than twice those ordered previous to July 1. This argues well for 1923.

The one-man, single-truck cars with 28-ft. body which are quite universally known as safety cars are still being bought extensively. There were 772 of these purchased during 1922 as compared with 565 for 1921. There were also 269 one-man cars bought with bodies longer than 28 ft. Of these latter 196 had double trucks and seventy-three were single-truck cars. Of the one-man double-truck cars forty were purchased for interurban service. In addition to these types one-man, two-man cars make their first appearance in our tabulation of statistics this year. There were 471 one-man, two-man cars purchased for city service and 9 for

interurban service. This type of car gives promise of becoming a very popular one for city service.

An attempt has been made this year to obtain data as to the total number of cars in service that are operated by one man. While the information received is not entirely complete, it appears that there are approximately 7,500. Of these approximately 5,500 are the 28-ft. safety car type. The accompanying table of cars

TABLE 1-NEW ROLLING STOCK ORDERED SINCE 1907

Year	—Passenge City	er Cara— Interurban	Freight and Miscellaneoua Cars	Electric Locomotives	Total
					6,216
1907	3,483	1,327	1,406	(a)	
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
	3,820	547	1,147		5,514
1913				(a)	
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	1 <u>7</u>	3,598
1921	1,059	129	81	7	1,276
1922	2,912	187	405	34	3,538
(a)	Included in "Fr	eight and Mia	cellaneous Cars.''		

TABLE II—SPECIAL COMPARISON OF NEW ROLLING STOCK ORDERS
BY YEARS

	1922	1921	1920	1919	1918	1917	1916
Number of railways reporting new cara	145	94	172	160	140	182	250
City Service Number of one-man cars (28 ft. body S.T.)	772	565	1699	1383	644	280	187
Number of one-man cars other than 28 ft. body Number of one-man.two-man cars Number of two-man passenger	227 471				• • • •		
motor cars* Number of passenger trailers Service cara	1290 150 103	383 111 47	847 343 104	635 111 31	1068 130 (a)	1316 402 (a)	2731 128 (a)
Total cars city service	3,015	1,106	2,993	2,160	1,842	1,998	3,046
Interurban Service Number of one-man cars Number of one-man, two-man	40		• • • •				• • • •
cars Number of two-man motor cars* Number of passenger trailers	122 16	103	195 32	96 32	200	158 27	303 71
Number of freight, express and miscellaneous cars	302	34	361	141	(a)	(a)	(a)
Total cars interurban service	. 489	163	588	269	255	185	374
Total number of cars Number of electric locomotives	3,538 34	1,269 7	3,581 17	2,429 18	44	2,406 49	3,911 31
Total number of cars	3,538	1,269	3,581 17	2,429	2,375 44	2,406 49	3,911

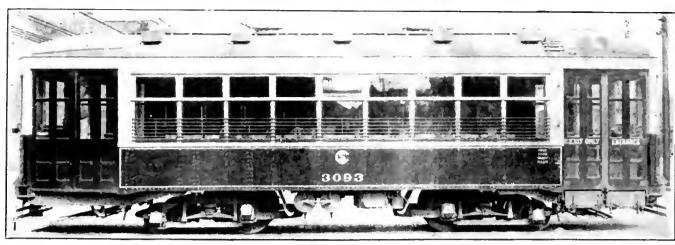
* Includes motor and trail cars for anbway, elevated and train service.

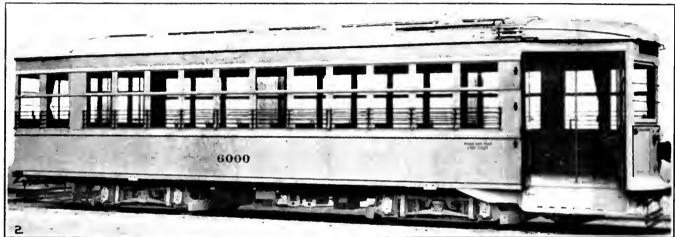
(a) Not available.

remodeled during 1922 shows a total of 763 cars that were remodeled for one-man operation during the past year

There were seventeen electric railway systems that placed orders for 50 or more cars. Of these the Chicago Surface Lines ordered 169 double-truck 59-ft. cars and forty-five double-truck one-man cars; the city of Detroit ordered 200 double-truck two-man cars; the Boston Elevated railway ordered 160 one-man, two-man cars and forty motor cars for subway train operation, and the United Electric Railways of Providence, R. I., ordered 150 one-man, two-man cars and twenty-

Four Types of Cars Developed During 1922





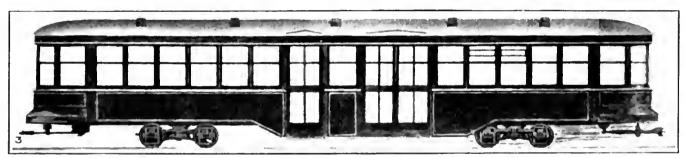




Table III-Details of Rolling Stock Ordered During 1922 New England District

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Overall	Seating Capacity	Total Wt.Light (Tons)	Equipped With Safety Devices	Cars Junked During Yr.
CONNECTICUT	35	Passenger Passenger	C I	M M	ST DT	1	28' 1'' 40' 3''	32 54	8.25 13.85	Yes Yes	66P 218
MAINE The Androscoggin & Kennebee Ryc Co. Bangor Ry. & Elec. Co. Central Maine Power Co. Cumberland County Power & Light Co.	3 1 2 3 3 1	Passenger Passenger Passenger Passenger Passenger Passenger Passenger Sweeper	I C I C C I I I C	M M M M M M M M	DT ST DT ST DT DT ST	1 1 1 1 2	40' 3'' 28' 5'' 40' 3'' 28' ½'' 28' 40' 3'' 40'	52 32 52 32 32 54 54	7.5 15 8	Yes Yes Yes Yes Yes Yes No	4 1M 37 CM
MASSACHUSETTS Bostno Elevated Ry. Co Brockton & Plymouth St. Ry. Eastern Massachusetts St. Ry. Co. Massachusetts Northeastern St. Ry. Co. Nahant & Lynn St. Ry. Co.	25	Passenger Passenger Sweepers Passenger Passenger Passenger Passenger Snow Plow	C (Snbway) C I C C C C C	M M M M M M	DT DT ST DT ST	I-2 Train	45' 0'' 47' 3'' 40' 3'' 28' 3'' 41' 3½'' 28'	50	26.00 14.00 8.00 15.75	No	3 IM 147 CM
NEW HAMPSHIRE Exeter, Hampton & Amesbury St. Ry. Keene Elec. Ry. Co.	l 3	Passenger Passenger	C C	M M	ST ST	-	28' 30'	32 32	8.0	Yes Yes	2 CM
RHODE ISLAND United Elec. Rys. Co	1 4 2 25	Passenger Sweeper Snow plow Dump Passenger	C C C C C	M M M M	DT DT DT DT ST	i-2 i	41' 39' 42' 4'' 40' 6'' 27' 10''		15.30 27.49 21.43 23 8.34		24 C M (Service) 8 CM (Pass.)
Total for New England District	470										

North of the Ohio and East of the Mississippi River

DISTRICT OF COLUMBIA The Capital Traction Co. Washington Ry. & Elec. Co. LILLINOIS Bluomington & Normal Ry. & Lt. Co. Chicago, Aurora & Elgin R.R. Chicago No. Shore Ry.	2 40 10 20 15 1	Sweeper Passenger Passenger Passenger Freight Line Passenger Passenger Dining	C C I I I I I I I I I I I I I I I I I I	M M M M M M M M	ST DT ST DT DT DT DT	1 2 2 1 2	28' 3" 42' 3" 28' \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	32 8 56 36.5 32.3 54.49.55 58.20 51.6	Yes	23 CM 19 CT
Chicago Surface Lines Chicago Surface Lines Chicago & West Towns Ry. Co. Danville St. Ry. & Lt. Co. Decatur Ry. & Lt. Co. Illinois Power Co. East St. Louis & Suburban Ry. Metropolitan West Side Elevated Ry. Co.		Parlor Passenger Passenger Passenger Sweepers Snow plow Passenger Passenger Passenger Work Passenger Work Passenger	C C C C C C I I I Elevated	M M M M M T M M M M M M M	ST DT DT ST DT ST ST DT DT	1 2 1 1 1 1 1 1 2 2 Train	28' 1"' 48' 11"' 39' 71" 28' 3 "' 47' 0 "' 42' 6" 28' 1" 28' 1" 28' 1" 28' 1" 28' 1" 28' 1" 28' 1" 28' 1"	50 35.25	Yes Yes Yes	
Peoria Ry. Co. Urbana & Champaign Ry., Gas & Elee, Co. Urbana & Champaign Ry., Gas & Elee, Co. INDIANA Chicago, South Bend & Northern Indiana Ry. Co. Indianapolis Street Railway Co. Indiana Service Corp. Interstate Public Service Co. Lafayette St. Ry., Inc. Terre Haute Traction & Lt. Co.	18 3 1 2	Passenger Passenger Freight, flat Service Work Work Passenger Freight, box Passenger Passenger Passenger Work Stock	C C C C C C C C C C C C C C C C C C C	M M T M T M T M M M M			28' ½" 38' 2" 34' 0" 34' 0" 34' 0" 40' 3" 40' 2" 28' ½" 38'	32 8 32 8 9 15 25 34 73 48 12 73 48 12 73 33 8 48 25 15	No Yes No	I IM (Work) I CM (Service)
Union Trac. Co. of Iodiana. MICHIGAN City of Detroit,—Dept. of St. Rys. Detroit United Ry. Grand Rapids Ry. Co. Menominee & Marinette Lt. & Traction Co. NEW JERSEY	27 5 200 8	Passenger Stock Passenger Passenger		M T M	DT ST	2	28' 4" 48' 5½" 28' ½"	34 8 52 18.66 32 8.0	Yes Yes	3 CT 128 8 CM 7 IT
Atlantic & Suburban Ry, Cumberland Traction Co Trenton & Mercer County Trac. Corpn	6 2 2 2 1 1	Passenger Passenger Sweeper Plows - Crane Comb.	C I C & I C & I C & I	M M M M M M	ST DT DT	::	28' 1'' 40' 3'' 29' 43' 45' 43'	50		2 IM (Service) 2 IM (Sweepers)

MISSISSIPPI Delta Light & Traction Co Jackway Public Service Co

Table III—Details of Rolling Stock Ordered During 1922—(Continued) North of the Ohio and East of the Mississippi River—Continued

North of the Ohio				1 1			1		18)	cty	*: *
Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	rength Overall	Seating Capacity	Total Wt.Light (Tons)	Equipped With Safety Devices	Cars Junked During Yr
Singhamton Ry. NEW YORK	7	Passenger	C	M	DT	1	37'	42	16	Yes	
Inghamton Ry. Imira Water, Light & R. R. Co. Imira Water, Light & R. R. Co. Imira Water, Light & R. R. Co. Independent of the Co. Interborough Rapid Transit System. Interborough Report System. Interport of Co. Interport Transit System. Interport Transit System.	30 1 12 10 1	Passenger Passenger Passenger Passenger Passenger Line Passenger Passenger Sweeper Passenger	CC Tube C C C C C C C	M M T M M M M M	ST DT DT DT DT ST ST ST	Train Train Train Train I	27' 10" 51' 34" 51' 4" 69' 5" 28 4" 27' 10"	44 78 82 3 32	37 27.5 58.6 64.5 	Yes Yes Yes Yes	3
The Cincianati Traction Co		Passenger Express & Mail Passenger Passenger Passenger	1 C C C	M M M M M	DT DT DT DT	1 1-2 1 2	39' 8'' 40' 43' 41' 11'' 52' 51''	46	14.25	Yes Yes	46 CM
The Cleveland Hy	8	Dump Dump	0000	M T T	DT DT	::	40' 6"		23 15		
The Community Traction Co Dayton, Springfield & Xena So. Ry.	50	Passenger Dump Passenger Passenger	C	M M	DT DT DT	i	49' 2" 40' 6" 41' 11" 44' 5 "	52 46	25 13 13.75	Yes	
The Dayton St. Ry. Co. Dayton & Western Traction Co. The Fostoria & Trennont Ry. Co. Lima City St. Ry. Maumee Valley Ry. Northern Ohio Traction & Light Co. The Pennsylvania—Ohio Electric Co. Portsmouth St. Ry. & Ist. Co. The Steubenville, East Liverpool & Beaver Valley Trac. Co. The Steubenville, Co. The Toledo & Westero R. R. Co. The Western Ohio Ry. Co. The Youngstown & Suburban Ry. Co.	20 7 4 5 6 25	Dump Passenger Dump Cars Passenger Passenger Express Passenger Passenger Passenger Passenger Passenger Passenger Passenger Passenger Passenger	C C C C C C C C C C C C C C C C C C C	M M M M T M M M M M M	DT ST DT DT ST DT DT DT	1 2 1 2 1 2 2 1	40' 6" 28' ½"' 45' 28' ½"' 39' 8"' 56' 28' ½"' 42' 11"' 30' 1"' 41' 2"' 41' 6"'	34 48 33 49 52 32 45	16. 22 8 16. 22 8 13 30 7. 5 13. 35 16. 22 14. 5	Yes Yes Yes Yes Yes Yes Yes	1 FM
PENNSYLVANIA Buffalo & Lake Erie Trae. Co. Coneatoga Trae. Co. Eastern Peonsylvania Rya Frankford Elevated Ry Harrisburg Hya. Co. Northampton Transit Co. Philadelphia Rapid Transit Co. Philadelphia & West Chester Trae. Co.	50	Passenger Passenger Passenger Passenger Passenger Passenger Snow Plaw	C C EI.	M M M M M	ST ST DT DT DT ST	Train	44' 8''' 28' 3''	48	2 9 3	Yes Yes	24
Pittsburgh Hys. Co	1 46	Dump Passenger Passenger	C & I	M M M	DT DT DT	1-2	40' 6" 45' 45'	1 50	. 23 6 17 2 15	No	
York Railwaya Co	1 1	Dunip Passeoger	C	M	DT ST	. 2	40' 6" 34' 11"	١.	25 8 11.5		Jo in (Open)
WISCONSIN Eyst Wisconsin El. Co. Milwaukee Elec. Ry. & Lt. Co.	1 10 2	Passenger Flat, spec. Work erane Dump, side Dump, center	00000	M T M T	ST DT DT DT	1	28' 3'' 30' 40' 3'' 35' 6'' 35' 6"	3.	2 8.5	Yes	ar marina
Wisconsin-Minnesota Lt. & Power Co	4 4 2	Passenger	5	M			28' 1'			Yes	4 CM
Wisconsin Ry , Lt. & Power Co	6	Passenger Passenger	c	M	DT	į į	43' 9" 28' 3"	4	6 13 5	Yes	
Total North of the Ohio and East of the Mississippi River.	. 1606										
South of the	e Oh	io and East o	f the M	issis	sippi	River	r		:		
Ficksopville Traction Co FLORIDA	. 47	Passengez	c	M	ST	Ι,	28' 4"		2 7 5	Yes	12 CM
Minim Beach El Co Minimited Hailway of St. Petersburg Pensacija Elec Co Tampa Elec Co Tampa Electric Co	1 8 20 4	Passenger Passenger Passenger Passenger	00000	M M M M	ST ST ST		28' 4" 28' 28' 4" 28' 4" 45' 8"	3 3	3 8 0 2 8 0	0 Yes 0 Yes 0 Yes	
Augusta-Aiken Ry. & El. Corp. of So. Carolina	. 15	Express Passenger	c ¹	M		1 .	45' 28' }"	3	2 8 5	Yes	31 CM
Brunswick & Interurban Ry. Co	{ 20 6 30	Passenger Passenger	C C C	M M M	DT		28' 4'' 44' 6'' 28' 4"'	4	2 8 0 8 17 4 2 8	Yen Yen	4 CM
KENTUCKY Kentucky Traction & Terminal Co	100	Express Passenger Passenger	i C	M M	DI	2	40' 28' 3''		15	Yes	
MISSISSIPPI		Dump	C & 1 C & 1 C & 1	N N T	TG DT	1	40' 6" 40' 6"		. 24		
THESISSING.		22	C	3.1	ST	1	28. 1"	1	7 8 0	15-	

Passenger Passenger 1 28' 1" 1 28' CALIFORNIA

Municipal Ry. of San Francisco.

Los Angeles Ry. Corp.....

Table III—Details of Rolling Stock Ordered During 1922 (Continued) South of the Ohio and East of the Mississinni River (Continued)

							wed)				
Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Overall	Seating Capacity	Total Wt.Light (Tons)	Equipped With Safety Devices	Cars Junked During Yr.
VIRGINIA Newport News & Hampton Ry., Gas & Elec. Co. Virginia Ry. & Power Co. WEST VIRGINIA Monongahela Power & Ry. Co. Tygart's Valley Traction Co. Wheeling Traction Co. Total south of the Ohio and East of the Mississippi River	75	Passenger Passenger Freight, (Box) Passenger Dump Dump	C C-I C-I	M M M M	ST ST DT ST DT DT	i ::	82' 4" 31' 0" 36' 28' ½" 40' 6" 40' 6"	33	8 4.8 8 24	Yes	CT 6 CM

West of the Mississippi River

Pacific Electric Ry	50 1 2	Passenger Crane Freight flat	C C	M	DT DT DT	2	52' 22' 37'	2" 2" 3"				
San Diego & Arizona Ry. Co	20	Stock Freight	I I									14
San Diego Elec. Ry. Co	10	Passenger Work	C	M	ST	1	28'	3"	33	8.05		
San Francisco-Oakland Terminal Rys	15	. Passenger	C C	M	DT	2 2	48'	6′′		19 30	No	9 CM
San Francisco-Oakland Terminal Rys. Union Traction Co.	5.5	Passenger Passenger Passenger	CC	M M		1-2	44'	10"	48	17.5	${\displaystyle \operatorname*{Yes}_{\mathrm{Yes}}}{\displaystyle \operatorname*{Yes}}$	
COLORADO The Western Lt. & Power Co	1	Passenger	С .	м	ST	1	30′	1"	32	9	Yes	1 CM
Caldwell Traction Co												2 IM
Des Moines City Ry. Sioux City Service Co. Tri-City Ry. Co. of Iowa.	5	Passenger Passenger Passenger	C C C	M M M	DT	1-2 1-2	36' 38'	2'' 6''		14 13.5	Yes Yes	
KANSAS Atchison Ry. Lt. & Power Co. The Kansas El. Power Co. The Southwestern Interurban Ry. Co. The Topeka Ry. Co. Wichita R.R. & Lt. Co.	2 5 1 10 15	Passenger Passenger Passenger Passenger Passenger	00000	M M M M M	ST ST ST ST ST	1 1 1 1	25' 28' 28' 28' 28' 28'	5"	30 32 34 32 32	18	Yes Yes Yes Yes Yes	
LOUISIANA Baton Rouge Electric Co	5 5 2 2 100 5	Passenger Passenger Dump Dump Passenger Passenger	000000	M M M T M	ST ST DT DT DT ST	1 1 2 1	28' 28' 40' 40' 47' 28'	681	32		Yes	2 CM
MINNESOTA Wisconsin Ry., Lt. & Power Co	3	Passenger	c	м	ST	1	28'		30	8	Yes	
MISSOURI The Kansas City Rys. Co	{ 20 20	Dump Passenger	C-I C C-I	M M T	DT DT DT	1-2	40' 44' 40'	10"	58	26 21-29 16	Yes	2
Springfield Traction Co United Rys. Co. of St. Louis		Dump Passenger	C-1	M	DT	· · · · · · · · · · · · · · · · · · · ·	50'	·	l	19.79	l	5 CM
NEBRASKA The Lincoln Traction Co												1 CM
OKLAHOMA Chickasha St. Ry. Co. Muskogee El. Tr. Co. Oklahoma Ry. Co.	6 20	Passenger Passenger	c C	M M	ST ST	· į	28' 28'	1""	32 32	8.5 8.5	Yes Yes	. 2

Tri-City Ry. Co. of Iowa	6	Passenger	C	M	DT	1-2	38'	6′′	44	13.5	Yes	
KANSAS Atchison Ry. Lt. & Power Co. The Kansas El. Power Co. The Southwestern Interurban Ry. Co. The Topeka Ry. Co. Wichita R. R. & Lt. Co.	2 5 1 10 15	Passenger Passenger Passenger Passenger Passenger	CCCCC	M M M M M	ST ST ST ST	1 1 1 1	25' 28' 28' 28' 28' 28'	5" 1" 2" 2"	30 32 34 32 32	8.5	Yes Yes Yes Yes Yes	
Baton Rouge Electric Co Monroe St. Ry New Orleans Public Service, Inc Shreveport Rys. Co	5 5 2 2 100 5	Passenger Passenger Dump Dump Passenger Passenger	CCCCC	M M M T M	ST ST DT DT DT ST	1 1 2 1	28' 28' 40' 40' 47' 28'	177 6 77 6 77 6 77 8 77 8 77 8 77 8 77 8	32	8.00 8 24 16 20.57 7.75	Yes	2 CM
MINNESOTA Wisconsin Ry., Lt. & Power Co	3	Passenger	С	М	ST	1	28'		30	8	Yes	
MISSOURI The Kansas City Rys. Co	1121	Dump Passenger Dump Passenger	C-1 C-1 C-1	M M T	DT DT DT	1-2 2	40' 44' 40' 50'	10" 6"	58	26 21-29 16		.6 5 CM
NEBRASKA The Lincoln Traction Co												1 CM
OKLAHOMA Chickashā St. Ry. Co. Muskogee El. Tr. Co. Oklahoma Ry. Co.	 6 20	Passenger Passenger	C C	M M		· ;	28' 28'	1" 1" 1"	32 32	8.5 8.5	Yes Yes	. 2
TEXAS											[
Dallas Ry. Co	1121	Passenger Express Dump	C&1	M M M	DT DT DT		45' 45' 40'	8′′ 6′′		15 22		1 C
Eastern Texas Elec. Co El Paso Electric Ry. Co												4 CM
Houston Electric Co			C C C C	M M T	DT ST DT	i	39' 28'	7"; 1";	48 33	13.9	Yes Yes	6 CT
San Antonio Public Service Co	15	Passenger	С	. M	ST		28'			8.4	Yes	.1
UTAH Salt Lake, Garfield & Western Ry. Co	1 13	Passenger (cl.) Passenger(op)	I I	T	DT DT	• •	69' 55'	8"	96 100	26 20		3 IT
Lewiston-Clarkston Transit Co	i i i	Passenger Work	C	M	ST ST			½" 			Yes	4 Pass. I
	:::			:::								1 1T 1 F1 4 IM
Puget Sound International Ry. & Power Co	:::											i CM
Cheyenne Elec. Ry, Co		Passenger	C	М	ST	1	28'	1 "	33	. 8	Yes	
Total West of the Mississippi River	843						(

Table III—Details of Rolling Stock Ordered During 1922 (Concluded)
Canada

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Overall	Scating Capacity	Total Wt.Light (Tons)	Equipped With Safety Devices	Cars Junked During Yr.
BRITISH COLUMBIA itish Columbia Elec. Ry. Co., Ltd											1 CM + F Box 1 Service
MANITOBA Winnipeg Electric Ry. Co	1	Service	С	M	DT		34' 0"	1 1			
NEW BRI'NSWICK Moneton Tramways Elec. & Gas Co., Ltd	2	Passsenger Snow plow	C C	M M	ST ST	1	28' 1"	30	7.75		· · · · · · · · · · · · · · · · · · ·
ONTARIO Oshawa Ry The International Transit Co. The London St. Ry. Co Toronto Transportation Commission	4 2 5 5 100 100 100 5 8 2	Passenger Passenger Passenger Passenger Passenger Passenger Service, flat Diff. Dump Diff. Dump Passenger		M M M M M T M M T	DT DT ST ST DT DT DT	1-2 2 1 1 2	43' 9" 28' 9" 47' 49' 2" 40' 5" 40' 6" 50' 0"	34 32 52 60	9	Yes Yes Yes Yes	82 M 63 CT
QUEBEC The Hull Electric Co. Levis County Ry Montreal & Sonthern Counties Ry Quebec Ry., Lt., Heat & Power Co.	2 8 3 2 2 2	Passenger Passenger Snow Plow Snow Plow Passenger Passenger	1 CCC C	M M M M M T	ST	2 2	31' 28' 26' 40' 55' 55'	41 32	11 8,5 14 30 30 5	Yes Yes	21 CM
Total for Canada											

five safety cars. Aside from these, four other companies ordered 100 cars each, four more purchased seventy-five to 100 cars and five others fifty to seventy-five cars each.

This year's statistics include six rapid transit orders. The Interborough Rapid Transit Company, New York, and the Metropolitan West Side Elevated, Chicago, each purchased 100 cars; the Boston Elevated and the Long Island Railroad, New York, each purchased forty cars; the New York Central Railroad purchased thirty electric cars and the Hudson & Manhattan Railroad twenty-five cars.

The number of companies that reported new rolling stock ordered during 1922 is 145 as compared with ninety-four for 1921. These railways are approximately 18 per cent of all those in the United States

TABLE V- RECAPITULATION BY DISTRICTS OF CARS ORDERED DURING 1922

	New England Destrict	North of the Ohio and East of the Mississippi River	South of the Ohio and East of the Musissippi Hiver	West of the Mixer	Total for United States	Total for Cunada	Grand Total
Number of companies reporting	1.2	72	17	3 3	134	11	145
City Service One-man cars, 28 ft body One-man cars other than 28 ft	71	278	269	134	752	20	772
Single truck Double truck One-man, two-man cars	3 25 310	65 117 75	2	1 10 86	71 156 471	2	73 156 471
Two-man curs (surface) Motor cars for rapid transit trains Trailers	40	47.6 27.5 5.0	36	352	864 313 50	111	975 315 150
Service and miscellaneous cars	- 11	5.1	- 8	- 11	81	22	103
Tearleans city service	460	1,387	319	594	2 760	255	3,015
Interarbin service One-man double truck cars One-man, two-man cars Two-man cars Trailers	9	31 5 46 2		5	40 5 52 16	4	40 9 52 16
Motor cars for train service Express and freight cars Miscellaneous cars		70 52 13	7	228	70 287 15		70 287 15
Total cars interurban service	10	219	7	249	485	4	489
Electric locomotyses	1.4	8	4	7	33	- 1	34
Total cars and electric loco-	484	1.614	330	850	3.278	260	3,558

TABLE VI—RECAPITULATION BY DISTRICTS OF CARS REMODELED DURING 1923

Number of companies reporting 12 38 5 21 76 6 82	86003700000		** (***)		-			
Number of companies reporting 12 38 5 21 76 6 82		New England Dutriet	of the East of issippi I	P. P. S.	of the	for	for	
City Service Number remodeled for one-man operation Number remodeled for one-man, two-man operation Number remodeled for two-man operation Number of service and miscellaneous cars remodeled Total remodeled ears city service Interview Number remodeled for one-man operation Number remodeled Total remodeled ears city service Number remodeled for one-man operation Express, freight and miscellaneous ears remodeled Total remodeled ears for interurban service Total remodeled ears for interurban cars	Number of companies reporting	1.2		5	21	76	6	8.2
Number remodeled for two-man operation 3 100 3 183 289 321 610 Number of service and miscellaneous cars remodeled 30 3 1 34 15 49 Total remodeled cars city service 95 692 45 303 1,135 381 1,516 Interviton Service Number remodeled for one-man operation Express, freight and miscellaneous cars remodeled are for interurban service 7 39 9 8 63 63 Carter Total remodeled cars for interurban cars	City Serrice Number remodeled for one-man operation Number remodeled for one-man,		490		110	704	45	749
3 100 3 183 289 321 610			99		9	108		108
Total remodeled 20 30 3 1 34 15 49	operation	3	100	3	183	289	321	610
Service		30	3		1	3.4	15	49
Number remodeled for one-man operation 7 5 2 14 14 Number remodeled for two-man operation 25 4 3 32 32 Express, freight and miscellane-mis ears remodeled are for interurban service 7 39 9 8 63 63 Total remodeled ears for interurban service 7 39 9 8 63 63	Total remodeled cars city service	95	692	45	303	1,135	381	1,516
25 4 3 32 32 32 32 32 32	Number remodeled for one-man	7		5	2	14		14
Express, freight and miscellane ous cars remodeled 14 3 17 17 Total remodeled cars for interurban service 7 39 9 8 63 63 63 Total city and interurban cars			25	4	3	3.2		3.2
Total remodeled are for interurban service 7 39 9 8 63 63 Total retry and interurban cars	Express, freight and miscellane-							
urban service 7 39 9 8 63 63 Total city and interurban cars	ous entaremodeled		14		3	1.7		17
	urban service	7	39	9	8	63		63
	remodeled	102	731	54	311	1,198	381	1,579

and Canada. In order to show at a glance the comparative amounts of new rolling stock ordered since 1907 a chart and table have been prepared. The table divides the passenger cars into city and interurban types and gives separate tabulations for freight and miscellaneous cars and electric locomotives. The chart for the years since 1916 divides the number of cars purchased into those for interurban and city service.

A special comparison of cars ordered during the last seven years is given in Table II. Separate tabulations are given for cars in city service and those for interurban service. Referring to this table it is interest-

TABLE IV—ELECTRIC LOCOMOTIVES ORDERED DURING 1922

ORDERED DU	ICT N	G 1922		
North de IDI de	No.	Weight Tons		gth r All In.
New England District				
Aroostook Valley R.R Boston Elevated Ry	1*	37	30	71
New York, New Haveo and Hartford R.R North of the Ohio and East	12	180	69	0
of the Mississippi Rivers Baltimore and Ohio R.R	2	120	41	6
Chicago, Aurora & Elgio R.R. Pennsylvania R.R.	3	50 200	37	
Washington & Old Dominion Ry Youngstown & Ohio River	1	50		
R.R South of the Ohlo and East	1	50	• •	• •
of the Missiaalppi Rivers Norfolk and Western Ry West of the Mississippi River	4	200	97	2
Denver & Intermountain R.R. Lincoln Traction Co	2	28	37	1
Northeast Oklahoma R.R	1	50		
Sacramento Northern R.R	2	60	37	4
Yakima Valley Transporta- tion Co	1	['] 50	37	4
Canada The Oshana Railway Co	1	43		٠.
Total* Built in company's shops.	34			

ing to note how the number of safety cars purchased increased each year from 1916 up to and including 1920 and during the same period how the number of large two-man cars showed a gradual decrease. A comparison by percentage that the number of safety cars purchased is of the total number of motor-passenger cars purchased for city service shows that the highest percentage for safety cars was reached in 1919 and since that time there has been a gradual return to the use of larger cars. These percentages are 6.4 per cent for 1916; 18.1 per cent for 1917; 37.6 per cent for 1918; 69 per cent for 1919; 64.4 per cent for 1920; 59.6 per cent for 1921, and 27 per cent for 1922. The big drop in percentage this year is due to the more extended purchase of larger cars operated by one man.

Details of the rolling stock ordered by individual companies are shown in Table III. The railways in each state are alphabetically arranged and the various states are grouped into four districts in a similar manner to that followed in previous years. Canadian

Table VII—Cars Rebuilt During 1922

New England District

Name	Number	Class .	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All	Seating Capacity	Total Weight Light (tons)	Equipped with Safety Devices
CONNECTICUT The Connectieut Co The Shore Line Elec. Ry. Co	6 2 2 10 1	Wreckers Work Line Sand Snow Sweeper Passenger	000000		DT DT DT DT DT DT					
MAINE The Androscoggin & Kennebec Ry. Co Baogor Ry. & Electric Co Central Maine Power Co Cumberland County Pwr. & Lt. Co. MASSACHUSETTS	3 1 1 14 4	Passenger Passenger Passenger Passenger Passenger	01000	M M M M M	DT DT ST	1 1 1	36' 39'	32 40 	16 23	Yes Yes Yes
Boston Elevated Rys. Co Eastern Mass. St. Ry. Co Massaehusetts Northeastero Ry. Co. Springfield St. Ry. Co Union St. Ry. Co	1 8 6 4 12 3	Tower Car Sweepers Passenger Sweeper Passenger Passenger	CCTCCC	M M M M M M	DT DT DT DT DT	1 2 2	25' 0" 45' 4" 36' 41' 35' 10"	32	20.5 18.6 21 17.75	Yea Yes Yes
RHODE ISLAND United Elec. Rys. Co Total for New England District	-	Passenger	С	M	DT	1	35′ 8″	34	19.20	Yes

North of the Ohio and East of the Mississippi River

DISTRICT OF COLUMBIA Washington Ry. & Elec. Co	30 15		CC	M	DT DT	1 2	42' 4½'' 42' 4½''	43 40	18.78 18.78	
INDIANA Evansville & Ohio Valley Ry. Co Chicago, South Bend & Northern	8		ī							
Indiana Ry. Co	14 21 4 7 5	Passenger Flat	C C I I	M M T	ST DT		28' 43'		9 18 	No No
MARYLAND Potomac Public Service Co	2	Freight Gondola	ī							
MICHIGAN Detroit United RyGrand Rapids Ry. Co	25 17	Passenger Passenger	C	M.	· DT	1-2				
NEW JERSEY Five Mile Beach Elec. Ry. Co Trenton & Mercer County Trac.	3		ī							
Corpn	1 2		C&1	M M	ST DT		29' 31' 9''		14	
NEW YORK The Brooklyn City R.R. Co Empire State R.R. Corpn Fonda, Johnstown & Golversville	3		C	M M	DT DT	1-2	40′ 3¾″ 40	35 40	18.2 17.25	Yes Yes
R.R. CoInternational Ry. Co	111	Passenger Passenger	0000	M	DT	1	42' 45' 2'' 39' 5''	52 51	26 18.00	Yes Yes
N. Y. State Rys. (Syracuse lines)	77	Passenger Passenger Passenger	CC	M M	DT DT	1		34	17.45	Yea
Olean, Bradford & Salamanea Ry. Co. Plattsburg Traction Co. Second Ave. R.R.	4 4 4 1	Passenger Passenger Passenger	00001	M M M	DT ST DT	i	30' 38'	32 26 32	8.5	No Yea
Southern N. Y. Pawer & Ry. Corpn. Syraeuse & Suburhan R.R. Co Third Ave. Ry. System. United Traction Co	53 115	Passenger	0000	M M M M	DT ST ST	1	44′ 3″ 27′ 1″	48 26	22.5	No Yea
O1110 Cincinnati, Georgetown & Ports-	25	Passenger	С	M	DT	1		,		Yea
mouth R.R. Co	39	2 thousand a	C	M	DT	1	42′	32	32	No Yes
Valley R.R. Cn Dayton & Troy Elec. Ry. Co The Pennsylvania Ohio Elec. Co The Portsmouth St. R. R. & Lt. Co.	6 5	Passenger Passenger	LOCOC	M M M M M	DT DT DT DT	1 1 2 2 2	60' 45' 10'' 43' 6''	32 52 36	22 22	No No
PENNSYLVANIA Altoona & Logan Valley R. R. Co Buffalo & Lake Eric Trac, Co	8 2 9	Passenger	CCC	M M M	DT DT	1 1-2	31' 41' 6'' 38' 6''	29 44 38	11 19 17,65	Partial
Conestoga Traction Co Phila. & Westchester Trac. Co Reading Transit & Light Co Southern Cambria Ry. Co	5	Passenger Line Passenger	I I C 1	M M M M	DT DT DT DT	2 1-2 2	38′ 6″ 47′ 7″ 44′ 50′	56 44 52	17.65 15.88 22	Yea No No
Tarentum Brackenridge & Butler St. Ry. Co Weatchester St. Ry. Co	2 5		CC	M	ST	1	33′	32		
WISCONSIN Milwaukee Elec. Ry. & Lt. Co	50	Passenger	С	М	3Т	2	89′ 1″	93	37.5	
Total North of the Ohio and East	731									

Table VII (Continued)—Cars Rebuilt During 1922 South of the Ohio and East of the Mississippi River

Name	Number	Class	City or Interurban	Motor or Trailer	Single or Double Truck	One or Two Man	Length Over All	Seating Capacity	Total Weight Light (tons)	Equipped with Safety Devices
ALABAMA Mobile Light & R. R. Co GEORGIA	3	Passenger	C	м	ST	ı	30	32	13	Yes
Augusta-Aiken Ry. & Elee, Corp. of South Carolina Brunswick & Interurban Ry. Co	3 4 2	Passenger Passenger Passenger	CIC	M M M	2 ST 5 DT ST	2 2 1	32'	32		Yes
KENTUCKY Louisville Ry, Co VIRGINIA	5 33	Passenger Passenger	I C	M	DT ST	1	43′ 4′ 31′	34	24.40 11.50	Yes
Charleston Interurban R.R. Co	3	Passenger Passenger	C	M	DT	1		13.5 13.5		No.
Total South of the Ohio and East of the MississippilRiver	54									

West of the Mississippi River

	1					1 1			1 1	
CALIFORNIA			-							
Los Angeles Ry. Corpn	106	Passenger	C	M	DT	2	44' 7"	44	18.75	
		Passenger	C	71	DT	2 2	48' 0"	56	19.25	
Pacific Electric Ry. Co.		Passenger	č	M	DT	2	44' 7" 39' 6"	52 44	18.76	
CROTTO Line Ar Elleo Co	2 7	Passenger	č	M	DT	1-2			13.5	No Yes
San Diegn Flor Ry Co	10	Passenger Passenger	l č l	M	DT	ľïí	71		13.5	162
San Diegn Elec. Ry. Co. San Francisco-Oakland Terminal		r assenger	~	498	DI	1 1				
163 00	600	Passenger	С	M	DT	2	48'	48	46.9	No
San Francisco-Sacramento R.R. Co.	3	Caboosa Flat		***	10.	•	10	1	''''	210
	"	to Refrigerator	I							
IOWA			*							
owa Southern Utilities	2 3	Passenger	I	M	DT	1	38' 0"	36	14 1	No
Mississippi Valley Electric Co	3	Passenger	C	M	ST	11	1		1 1	Yes
LOUISIANA	1 .1					١.				
Shreveport Rys. Co	1	Passenger	C.	M	DT	2				No
(Two single truck ca	rs e	onverted into one	doub	le t	ruck	sid	e entran	ee c	ar)	
MISSOURI					1					
The Kansas City Rys. Co.		D	_	M	DT	1-2	44'10"		19.40	Yes
pringfield Traction Co.	2 6	Passenger Passenger	C	M	ST	1 -				
Traction Co.,	1 6	Passenger Passenger	Č	NI	DT					
United Rys. Co. of St. Louis	l i	Passenger	č	M	DT	Fit	37 97	1 45	20 68	
	∣ '	r machiger		311	171	Ι'	34 7	74	20 00	
NEBRASKA -						1	l	l .		
The Lincoln Traction Co	5	Passenger	l c	M	DT	i i	l 	l		
	1		~			Ι.		l		
TEXAS							1			
Eastero Texas Elec. Co	1		C	M		1		l		
El Paso Elec. Ry. Co	11	Passeoger	C	M	DT	1	42'	44	20	Yes
HOUSEON Electric Co.	1 11	Passenger	C	M	ST	1	30' 10"	32	11 0	Yes
San Antonio Public Service Co	30	Passenger	Č	M	ST	1	32' 3"	36	11.2	Yes
UTAH							1	1		
Salt, Lake, Garfield & Western Ry	١.		١.			1		١		
sale, Lake, Garnaid & Western Ry	3	Passenger	I	M	DT	1	56' 8"	66	38	
WASHINGTON			1	1		1		ĺ		
Puget Sd. Internati. Ry. & Pwr. Co.	4	Passenger	C	M	ST	l .	22' 10"	33	6.5	Yes
Seattle Minnininal St. Ru	70	Passenger Passenger	l č	M	DT		43' 9"	33	24 36	
Seattla & Rainier Valley Ry. Co	6		l č	M	DT	Ш	42	122	22	Yes
taney ity, Co	-	r masenger		1 ***	101	1.	74	""	1 44	1 628
Total West of the Mississippi River	1			1	1	1	1	i		

Dominion of Canada

Total for Canada	381										
ONTARIO Brantford Municipal Ry Port Arthur Civic Ry	11	Passenger Passenger		C	M	8T	1				
	6 2	Closed Sweepers Plaws	}		ang		otn	left to	right	hand	opera-
	41	Single End Paye Double End Paye Double End		Ch	ang	ed for	on	e-man e	pera	tion.	
British Columbia Elec. Ry, Co	31	Single End Paye Double End Paye	}			ged fr		44']" left_to r			Yes
BRITISH*COLUMBIA	7	Service	١.					tion)			
NEW#BRUNSWICK New,Iteunawick Pwr. Co.	40	Passenger						anged f	tom	left t	a right
QUEBEC Quebec Ily , Lt., Ht. & Pwr. Co., Ltd Iull Elec. Co.	10	Passenger Passenger		c	M	DT ST	1	31'	35	Ťi	Yes

companies are listed separately. The only details of construction given are type, over-all length, and weight. The service for which the cars were purchased is also given. The district north of the Ohio and east of the Mississippi purchased 1,614 cars and locomotives, which is 45 per cent of the total rolling stock ordered. The percentage increase over last year for cars ordered by the various districts is 582 per cent for the New England district, 161 per cent for the district north of the Ohio and east of the Mississippi, 392 per cent for the district south of the Ohio and east of the Mississippi, 295 per cent for the states west of the Mississippi and a decrease of 14 per cent for the Canadian railways. A recapitulation of the totals for cars and electric locomotives ordered during 1922 is given in Table V.

The companies which purchased or built electric locomotives during 1922 are given in Table V. The total number of new electric locomotives is 34, which is the largest for any year since 1918.

Some information regarding cars reconstructed during the year 1922 is given in Tables VI and VII. This is the first year we have included this information in our tabulation. Eightytwo railways reported the reconstruction of 1,579 cars. There were 749 cars reconstructed for one man operation in city service and 14 for interurban service. A total of 108 cars were reconstructed for operation by either one or two men. Seventy-five of these are being reconstructed for the Brooklyn City Railroad. change from left to right hand operation by the British Columbia Electric Railway and the New Brunswick Power Company made it necessary to reconstruct all their rolling stock.

The information given in the various tables of rolling stock was obtained from replies received to questionnaires sent to all the electric railways in the United States and Canada. It is quite impossible to receive replies from all railways when a definite date of publication must be met, but this year replies were received from approximately 750 railways. The information thus obtained has been added to by items previously published and by very complete lists furnished by the car builders. Through the courtesy and co-operation of the various car builders we have been able to check these figures very carefully and in some cases where replies were not received from railways the information furnished by the car manufacturers has been used.

New Automotive Equipment Ordered

Many Electric Railway Companies Acquiring
Motor Buses and Service Trucks

N connection with the statistics of rolling I stock purchased by electric railways this year there is included a new departure which consists of obtaining the number of motordriven vehicles ordered by electric railways during 1922. This information has been classified to give the number purchased, the class of service for which they are intended, as far as possible, and such information regarding the type of the chassis and body as will enable one to form a good idea of the construction. The number of gas-driven buses was 240, and in addition to these there were six trolley buses and two gas-driven rail cars. The remainder of the equipment purchased consists of 112 service trucks, including tower wagons, dump cars and trucks for carrying freight and express. No attempt has been made to include the large number of ordinary passenger touring cars and runabouts purchased for official and departmental use in the operation of electric railways. In the table of statistics given in the Jan. 7, 1922, issue, figures were given showing the total automotive equipment owned by the electric railways in the United States. The additional information now furnished should permit a satisfactory estimate as to total automotive equipment now being operated. In tabulating these statistics it has been somewhat difficult to assign every vehicle to the particular service for which it is to be used, owing to the fact that trucks are frequently used for several different departments. They are therefore called service trucks in such cases. The mobility and speed of the gasoline-driven motors truck ha made it valuable as emergency equipment.

Electrification Work to Proceed

CSIR MONTAGUE BARLOW, Minister of Labor, speaking in the House of Commons on Nov. 30 on the subject of the relief of unemployment and detailing kinds of work that would to relieve the situation, stated that the Chairman-elect of the Southern group of English railways had to press on with the electrification of the South Eastern & Chatham railway suburban lines, and extend the electrification of the London, Brighton & South Coast and the London & South Western Railways. The Government is renewing for another year the Trade Facilities Act and has increased from £25,000,000 to £50,000,000 the capital sum for which Government guarantee of principal and interest for works of public utility will be available.

Automotive Equipment Ordered During 1922

ratomotive Eq.		ment Of	dered D	urme 17		
		of Class of es Service	Type Chassis	Body Builder	Caps Seats	acity Tons
Intercity Terminal Ry. Co., No. Little Rock, Ark Los Angeles (Cal.) Ry. Corpn	5	Motor Bus Motor Bus	Reo	Paterson Pac. Motor	14	
Pacific Elec. Ry. Co., Los Angeles,	5	Motor Bus Motor Bus	Moreland White	Body Co.	18 19 25	
Pacific Gas & Telec. Co., Sacra-	5	Dump Cars			• • • • •	
mento, Cal. San Diego (Cal.) Elec. Ry. Co	2	Motor Bus Motor Bus Motor Bus	White-50 Fageol Republic	Co. Shops	25 27 24	
	i	Motor Bus Motor Bus Serv. Trk.	Reo Fageol Ford		20 31	i
	I	Line Dept. Trk.	Fageol			2}-3 5
San Joaquin Lt. & Pwr. Co	1	Maiot, Trk. Motor Bus	Fageol White-15	White Auto	30	
Washington (D.C.) Ry. & Elec. Co.	3	Motor Bus Motor Bus	White-15 Wnite-50	Hoover Hoover		
Indianapolis (Ind.) St. Ry. Co	2	Tower Wagons Tower	Ford			1
La Fayette (Ind.) St. Ry	1	Wagons Frt. Exp.	G.M.			1
	1	Trks. Frt. Exp.	Service			2
Dubuque (1a.) Elec. Co	1	Trks. Serv. Trk. Serv. Trk.	Republic Republic			5
Louisville (Ký.) Ry. Co New Orleans (La.) Public Serv. Co United Rys. & Elec. Co., Baltimore,	1	Serv. Trk.	White	D	22	2
Md	3 27 4	Trolley Bus Motor Bus Motor Bus	Lansden Republic 5th Ave. Coach	Brill Hoover 5th Ave.	24	
Boston (Mass.) Elevated Ry. Co	1	Motor Bus Motor Bus	Republic Mack	Coach Hoover Boston	51 25	
	1	Motor Bus	White-50	Body Co. Brown	25	
	8 1	Serv. Trks. Serv. Trks.	White-15 White-20	Body Co. Keen Bros. Abbott &		· · · · · · · · · · · · · · · · · · ·
	3	Serv. Trks.	Ford	Downey Springfield Exp.		1
Worcester (Mass.) Consolidated St. Ry. Co	ļ	Serv. Trks.	Federal			2 3 ½
Twin City Rapid Tr. Co., Minne- apolis, Minn	1	Serv. Trks. Trolley Bus	Federal Lansden	Brill	30	
	3	Serv. Trks. Serv. Trks.	Ford G.M.C.		22	1
Springfield (Mo.) Traction Co United Rys. Co. of St. Louis, St.	3	Motor Bus Serv. Trk.	Reo Chevrolet			13
Louis, Mo	2	Tower Wagons	<u></u>	A 7 A 1		2
Lincoln (Neb.) Traction Co Manchester (N. H.) Trac. Lt. & Pwr. Co	1	Serv. Trk. Serv. Trk.	Ford Republic	Co.'s Shops		1 1}
Fonda, Johnstown & Gloversville (N. Y.) R. R. Co.	2	Gas Motor Cara		Brill		46–14
Jamestown (N. Y.) St. Ry	3	Motor Bus	Pierce- Arrow	Kuhlman		25
Second Ave. R.R. Co., New York, N. Y	3	Serv. Trks. Serv. Trks.	Federal			··· 3½
Community Trac. Co., Toledo, O	3	Serv. Trks. Serv. Trks. Serv. Trks. Serv. Trk. Serv. Trk.	Federal			1½ 1
	2 3 2	Serv. Trk. Serv. Trk. Serv. Trk.				1½ 2 3½
Northern Ohio Trac. & Lt. Co Pennsylvania-Ohio Elec. Co.,	16	Motor Bus	White		25	
Youngstown, O	12 7	Motor Bus Motor Bus	White Republic Dort	Bender Bender	18 25	· · · · · · · · · · · · · · · · · · ·
Tulsa (Okla.) St. Ry	6	Serv. Trk. Motor Bus Motor Bus	Garford Garford	Garford Garford	25 16	
T. C. Demonstrate	7	Motor Bus Motor Bus	$\begin{array}{c} \textbf{White} \\ \textbf{Reo} \end{array}$	Kuhlman	25 15	
Jefferson Trac. Co., Punxsutawncy, Pa	2	Motor Bus	Reo	Grove City Body	20	
Johnstown (Pa.) Trac. Co Schuylkill Ry. Co., Girardville, Pa.	3 6	Motor Bus Motor Bus			22 29	
United Elec. Rys. Co., Providence, R. I	4	Motor Bus	White	Brown Body	24	
	6	Motor Bus Motor Bus	Mack Republic	Mack Hoover McCardell	24 24	 2 5
	1	Tower Trks Dump Car Dump Car	White White Mack	McCarden		- 5
Olympia (Wash.) Lt. & Pwr. Co	2	Frt. Exp. Serv. Trk.	Ford G.M.C.			2
Pacific Northwest Trac. Co., Seattle, Wash	2	Motor Bus	White-45	Ideal Body Co.	18	
Puget Sd. Int. Ry. & Pwr. Co Seattle (Wash.) Municipal St. Ry	8	Motor Bus Motor Bus	Kleiber		29 25	
	1	Tower Trk. Serv. Trk.	White-20 Ford			1 ½
ATable	co	ntinued or	n page DD	.Q		

Automotive Equipment Ordered During 1922 (Continued)

					,
		Type Chassis			city Tons
2	Motor Bus	White		17	
2	Serv. Trks.	Ford			1
66	Motor Bus	(a)		14~25	
4.1	Serv. Trks.				
- 1	Serv. Trk.	Ford	Appleton		5
2	Motor Rua	5th Ave.	5th Ave.		
		Coach	Coach	29	
- 1	Motor Bus	Pierce-			
		Arrow	Smith Bros.	25	
1	Motor Bua	G.M.C.	Sterling		
				24	
- 1	Serv. Trk.	Dodge			- 13
2	Trolley Bus	Atlas	Atlas	30	
ch s	and others.	(b) Fords, l	Nash, Sterling, 1	Reos and	others
	2 2 66 41 1 2 1 1 2	2 Motor Bus 2 Serv. Trks. 66 Motor Bus 41 Serv. Trks. 1 Serv. Trk. 2 Motor Bus 1 Motor Bus 1 Motor Bus 1 Serv. Trk. 2 Trolley Bus	2 Motor Bus White 2 Serv. Trks. Ford 66 Motor Bus (a) 41 Serv. Trks. (b) 1 Serv. Trk. Ford 2 Motor Bus Coach Pierce-Arrow G.M.C. 1 Serv. Trk. Dodge Atlas 41 Serv. Trk. Dodge 2 Trolley Bus Atlas	2 Motor Bus White 2 Serv. Trks. Ford	2 Motor Bus White

Heavy Traction Service Records

The Author Quotes Data to Show Some of the Results Achieved by Several American Railroads with Electric Locomotives and Motor Cars

By Homer K. Smith

Railway Engineer Westinghouse Electric & Manufacturing Co.

TIIE Long Island Railroad was the first in the United States to substitute electric for steam power on a large scale, the change having been made on this road in 1905. Multiple-unit cars with two 600-volt direct-current motors and the third-rail contact system were adopted. Since electrification, this road's passenger traffic has increased nearly 400 per cent, and the freight traffic nearly 200 per cent, while the earnings have increased approximately 200 per cent. The annual passenger traffic is more than 600,000,000 passenger-miles, and at times the schedules require that more than 95 per cent of the equipment be on the road.

The New Haven Railroad has approximately 550 miles of track electrified on the single-phase system, both locomotives and multiple-unit cars being used. In 1921, the electric passenger locomotives averaged 33,000 miles per locomotive failure and the average detention per failure was eighteen minutes. The mileage per locomotive was nearly 69,000. The freight locomotive mileage per locomotive failure was approximately 22,500. These locomotives frequently make two round trips between Harlem River and New Haven in twenty-four hours, a mileage of 272. Under steam operation in this section the daily locomotive mileage was from 100 to 120.

The New Haven has in operation sixteen electric switching locomotives which, from 1915 to 1921, were in actual service more than 70 per cent of the total time. In 1916 they were in actual service over 77 per cent of the time. These locomotives operate twenty-four hours per day and consistently make 140 miles per day (based on 6 m.p.h.). They have produced a coal saving of 65 per cent over that required for steam operation on this service and have replaced steam locomotives at a ratio of 2 to 1.

On the occasion of the Yale-Harvard football game, Nov. 20, 1920, between 8 a.m. and 11 a.m. forty-four special trains were dispatched from New York to New Haven in addition to the regular trains. On the same day forty-five extras were operated in the opposite direction. The eighty-nine extra trains carried approximately 70,000 passengers, and all departed and arrived practically on schedule.

In 1910 the Pennsylvania Railroad placed in service on its electrified extension into the New York Terminal thirty-one 600-volt third-rail locomotives. From November, 1910, to November, 1918, they made a total mileage of 9,508,765, with a total of 121 engine failures, or an average of 78,600 miles per detention on account of locomotive trouble. During one year there was a total train delay, due to failure of motive power, of only fifty-five minutes. These locomotives are now averaging about 4,500 miles per month.

The Norfolk & Western was the first to substitute electric locomotives for Mallet locomotives for mountain grade service. This road electrified a 30-mile route from Bluefield to Vivian in 1914, the electrifica-

tion zone having since been extended approximately 8 miles to Farm. With steam operation, trains of approximately 3,250 tons were hauled up the Elkhorn grade by three powerful Mallets at 7 m.p.h. Two 300-ton electric locomotives hauled the same trains on this grade at 14 m.p.h. Twelve electric locomotives were purchased to replace twenty-four Mallets.

In a service where the average main-line haul is short, and where there is considerable coal mine setting out and gathering service as well as pusher service, these locomotives consistently do more than 100 miles per day. During 1920 they made an average mileage of 37,820. The steam locomotives formerly used in this service averaged about 60 miles per day.

The New York, Westchester & Boston Railway operates heavy motor cars on the single-phase system, in local and express service, from Harlem River Station of the New Haven Railroad. Local trains make a schedule of 22 m.p.h. with a stop every mile. The express train schedule is 37 m.p.h. with an average distance of 2½ miles between stops. In 1919 the average mileage per car was more than 42,000, and the average car mileage per minute of delay over 2,700.

In 1915 the Broad Street Terminal of the Pennsylvania Railroad in Philadelphia had reached the limit of its capacity of 160 trains per day on sixteen tracks with steam operation. The terminal was electrified on the single-phase system with the result that the time required to bring a motor car train into the station and get it out again is approximately one-third of the time required with steam operation. The track movements per train turn-around have been reduced from six to two. Approximately 600 trains per day are now operated through the six-track "bottle neck" at the interlocking tower. Between 5 and 6 p.m. fifty trains pass this tower, and during one seventeen-minute period of this hour there is a train movement every minute.

On the Chicago, Milwaukee & St. Paul electrification the passenger service from Harlowton to Avery is furnished by 3,000-volt direct-current locomotives with a one-hour rating of 4,200 hp. and a continuous rating of 3,400 hp. Soon after these locomotives were placed in service, it was decided to run them through the entire 440 miles without turning in at Deer Lodge shops for general inspection, as had been previously done. The locomotives are given a light inspection at the end of the 440-mile run and are sent to Deer Lodge for a general inspection on a mileage basis of from 3,000 to 5,000.

Individual locomotives in this service have made as much as 12,000 miles in one month. They have made the through run of 440 miles per day for twelve consecutive days during the most severe winter months.

Receiverships Lowest in Eight Years

Only Fourteen Companies Fail During 1922—Several Emerge from Receivership as Trying Period of Financial Stringency Passes—Total Number of Railways in Hands of Courts Decreases

HE total number of electric railways still in receivership Dec. 31, 1922, is slightly less than that for the previous year. The whole situation as regards the credit condition of the electric railways still reflects largely the effect of the war time period of depression on electric railways. During the past year, only fourteen companies, with a total mileage of 695.43, went into receivership. Two of these, the Michigan United Railways and the Cleveland, Southwestern & Columbus Railroad, alone, included 466.46 miles of the total shown. A comparison of these figures with the statistics of electric railway receiverships for the

fashion. Tables I and II give a record of electric railway receiverships and foreclosures by years since this work was first begun in 1909. The figures given in these first two tables are not cumulative but show the new companies involved in each individual year. The figures have been corrected in line with information received since they were published a year ago, consequently in comparing them with last year's issue, attention should be given to the footnotes.

The cumulative totals of all companies in receivership as of Dec. 31, 1921, and Dec. 31, 1922, are shown at the foot of Table V. This tabulation includes all the indi-

TABLE I—RECORD	OF ELEC	TRIC RAILW	AY RECEIV	ERSHIPS	TABLE II-	-RECORD O	F ELECTR	IC RAILWAY	FORECLOSU	JRE SALES
Year	Number of Companies	Miles of Single Track Involved	Outstanding Stock	Securities Bonds	Year	Number of Companies	Miles of Track Involved	Outstanding Stock	Securities Bonds	Receiver's Certificates.
1909	. 11	558.00 696.61	\$29,962,200 12,629,400	\$22,325,000 75,490,735	1909	21 22	488.00 724.36	\$22,265,700 19,106,613	\$21,174,000 26,374,075	(a) (a)
1911 1912 1913	. 26	518.90 373.58 342.84	29,533,450 20,410,700 31,006,900	38,973,293 11,133,800 47,272,200	1911 1912 1913	25 18 17	660 72 267.18 302.28	91,354,800 14,197,300 15,243,700	115,092,750 10,685,250 19,094,500	(a) (a) (a)
1914	. 10	362.39 1,152.10 359.26	35,562,550 40,298,050 14,476,600	19,050,460 39,372,375 10,849,200	1914 1915 1916	11 19 19	181.26 308.31 430.14	26,239,700 30,508,817 13,895,400	44,094,241 16,759,997 22,702,300	(a) (a) (a)
1917	. 21	1,177.32 2,017.61	33,918,725 92,130,388	33,778,400 163,257,102	1917	26 23	745.19 524_22	27,281,900 37,740,325	27,313,045 20,149,384	(a) (a)
1919 1920	. 19	3,781.12 1,065.31 986.42	221,259,354 28,758,455 32,909,525	312,915,104 72,283,575 36,177,800	1919 1920 1921	29 13 13	2,675.48 259.90 777,97	89,893,400 7,782,400 33,642,255	79,836,738 11,227,328 30,863,526	\$42,300 52,000 5,000
1922	14	695.43	18,140,150	20,304,400	922	13	322,88	7,491,500	12,640,600	114,683

(a) Corrected by adding to figures, shown last year, data for three companies: West Helena Consolidated Co., La Fayette Service Co., Pottstown & Phoenixville Ry. Co., which went into receivership in 1921, but were omitted through failure to receive information in time.

Table 11 does not include companies which were sold or reorganized without forcelosure proceedings.

previous years shows that the tendency toward an improvement in the street railway industry is continuing. The rising tide in the number of receiverships and foreclosures, and the mileage and amount of securities therein involved, reached the maximum point in the year 1919. In 1920, however, there was a material reduction in the number of companies which went into receivership and again the year 1921 showed a slight decrease in mileage and securities in receivership.

In order to permit comparisons with previous years the statistics have been presented herewith in the usual

vidual companies shown in last year's Table V with the exception of those which were sold at foreclosure, completely abandoned, or otherwise relieved of receivership during 1921. These were removed from the list. To the list have been added fourteen new receiverships which occurred during 1922, also three companies mentioned in the note under Table I which should have been included in 1921 but were omitted because the information was not then available. In accordance with more recent information certain minor changes and corrections also have been made in the various figures in order to bring them up to date. The companies emerging from receivership in 1922 have been deducted from the total of roads in receivership as of Dec. 31, 1922 (Table V).

A somewhat smaller number of companies have passed into the hands of the receivers during 1922. A résumé of their status—total mileage, outstanding securities, etc.—shows a steady improvement. These

TABLE III—ELECTRIC RA	ILWAY	RECEIVE	RSHIPS19:	22
Sir	Miles of gle Trac nvolved	k Outstandi Stocks	R ng Seeuritics Bonds	eceiver's Certifi- eates
Chicago & Interurban Traction Co. (Chicago, Ill.)Joliet & Eastern Traction Co. (Ill.) Manhattan City & Interurban Ry.	50.00 25.00	\$1,000,000 300,000	\$1,350,000 None	None None
(Manhattan, Kans.)	16.00 257.46	612,150 7,000,000	90,000 12,355,800	None None
N. Y.) Steinway Ry. Co. (Long Island City,	7.93	150,000	150,000	None
N. Y.)	26.00	None	1,500,000	None
Asheville & East Tennessee R.R. Co. (Asheville, N. C.)	6.34	70,000	35,000	None
Ry. Co. (Cleveland, O.)	209.00	6,648,000	3,510,000	None
Co. (West-Milton, O.)	38.00	1,150,000	550,000	None
Gallipolis & Northern Traction Co. (Gallipolis, O.)	5.00	\$20,000	\$48,000	None
Bangor & Portland Traction Co. (Bangor, Pa.)	8.70	130,000	130,000	3,000
Pottstown & Phoenixville Ry. Co (Pottstown, Pa.) Slate Belt Transit Co. (Pen Argyl, Pa.)	15.00 18.00	500,000 360,000	114,600 400,000	None 21,000
St. Albans & Swanton Traction Co. (St. Albans, Vt.)		200,000	71,000	None
Total for 1922 (14 companies)	695.43	18,140,150	20,304,400	24,000

TABLE IV—ABANDONMENTS—ENTIRE—1922

(Includes only companies whose entire traction property has been dismantled or permanently abandoned and not likely to resume operation)

	Miles	Stock	Bonds	
Cleveland & Erie Ry. Co. (Girard, Pa.) Interurban Ry. & Term. Co. (Cincinnati, O.) Springfield Ter. Ry. & Pwr. Co. (Springfield, O.).	13.00 25.00 30.00 47.55 30.00 38.12 5.85 5.00 18.50	\$200,000 300,000 300,000 3,500,000 350,000 979,350 (a) (a) 350,000	\$71,000 None 1,000,000 1,650,000 250,000 770,000 (a) (a) 500,000	
Total for 1922 (9 companies)	213.02	5,979,350	4,241,000	

Table V—Electric Railway Receiverships and Foreclosures as of Dec. 31, 1922

New England District

	11	Miles of	Outstanding Securities			
Name of Company	Year of Receiv- ership	Single Track Involved	Capital Stock	Funded Debt	Receivers'	
CONNECTICUT	Thurp	20101100	LIOUR	2000	Ceremoan	
Danbury & Bethel St. Ry. Co. (Danbury)	1917	13.00	\$320,000	\$588,500	\$100,000	
Hartford & Springfield St. Ry. Co. (Warehouse Pt.) Shore Line Electric Ry. (New London) (28)	1918 1919	48.00 67.20	785,000 1,000,000	961,000 2,725,000	None None	
MAINE						
Atlantic Shore Ry. (Kennebunk)	1915	49.93	1,000,000	1,746,250	None	
MASSACITUSETTS						
Brockton & Plymouth St. Ry. Co. (Plymouth) (1)	1919	22.00	250,000	260,000	None	
(Greenfield)	1927	18.15	235,000	230,000	None	
Connecticut Valley St. Ry. Co. (Greenfield)	1921	47.05	620,000	580,000	None	
Northern Massachusetts St. Ry. (Greenfield)	1921	44.09	500,000	500,000	None	
NEW HAMPSHIRE Portsmouth, Dover & York St. Ry. (Portsmouth)	1917	41.46	(E)	707,000	30,000	
VERMONT						
Barre & Montpelier Trac. & Pwr. Co. (Montpelier) St. Albans & Swanton Trac. Co. (St.	1920	9.75	120,000	100,000	None	
Albans) (3)	1922 1918	13.00 9.00	200,000 100,800	71,000 100,000	None None	
Summary Total 1/1/22	H cos.	370.50	4,810,800	12,713,521	110,000	
Net changes and corrections	l co.	0.87 13.00	120,000 200,000	4,215,771 71,000	20,000 None	
Less properties sold or reorganized Net receiverships 12/31/22	1 co. 11 cos.	22.00 360.63	250,000 4,880,800	260,000 8,308,750	None 130,000	

North of the Ohio and East of the Mississippi

ILLINOIS					
Alton Granite & St. Louis Trac. Co. (Alton). Aurora, Elgin & Chicago R. R. (Aurora) (33) Third Hail Division (3). Chicago & Interurban Trac. Co. (Chicago)	1920 1919 1919	66.00 102.00	6,200,000	3,000,000 3,636,000 4,735,000 1,350,000	None None None None
Chicago & Oak Park Elev. It.R. (Chicago) Chicago, Aurors & DeKalb It.It. (Aurors)	1911			5,992,500	2,210,000
Joliet & Eastern Trac. Co. (Joliet) (5)	1916 1922	30.20 25.00	950,000 300,000	427,500 None	None None
INDIANA					
Beech Grove Trac. Co. (Heech Grove) La Fayette Service Co. (La Fayette) (6) Winona Interurban Ity. Co. (Warsaw)	1917 1921 1916	3.90 25.00 70.00	1,250,000	100,000 1,250,000 2,343,700	None None None
MICHIGAN					
Houghton County Trac. Co. (Houghton). Marquette City & Presque Iale Ry.	1921	32,15	957,200	677,000	None
(Marquette) (#4) Michigan United Rys. (Jackson) Saginaw-Bay City Ry. (Saginaw) (7)	1912 1922 1921	6.00 257.46 64.22	200,000 7,000,000 2,600,000	100,000 12,355,800 2,063,000	None None None
NEW JERSEY					
Monmouth County Elec. Co. (Ited Bank)					
No. Jersey Rapid Transit Co. (Hohokus)	1916 1912	18.50 18.00	350,000 800,000	500,000 800,000	17,500 None
NEW YORK					
Binghamton Ity, Co. (Binghamton) Brooklyn Rapid Transit Co. (New York). Brooklyn Heighta R.R. Co	1918 1918] 1919	50.25 Holding Co. 5,12	978,995 74,422,959 1,300	(9) 2,422,160 68,114,700 250,000	30,000 12,000,000 None
Brooklyn, Queena County & Suburban R. R.	1919	65.58	900	4,531,000	None
Coney Island & Brooklyn Ry	1919	46, 15 136 10	297,400 105,925	5,474,000 13,571,928	None 70,000
Namau Electric Ry	1918	252.88	683,184	22,936,000	None
New York Municipal Ity, Corp Buffalo & Depew Ry, (Buffalo) (I)	1918 1918	85.73 13.59	305,000	2,207,000 350,000	None 60,000
Buffalo & Lackawanna Trac. Co. (Buffalo)	1918	8.80	55,000	1,000,000	None
Hornell Trac. Co. (Hornell)	1917	10 90	117,900	150,000	15,000
Interborough Consolidated Corp. (N. Y.) Manhattan & Queens Traction Corp.	1919	Holding Cu.	(25) 50,403,634	(25) 63,808,000	None
(Long Island City) (32) New York & North Shore Trac. Co.	1917	21.20	20,000	(10) 2,090,000	None
(Roslyn) (1)	1921	38.12	979,350	770,000	11,000 None
New York Rys. Co. (New York) (19) Ogdensburg St. Ry. Co. (Ogdensburg)	1919	(18) 92.66	\$17,495,060 150,000	58,773,027 150,000	None
Penn Yan & Lake Shore lly. (Penn Yan).	1918	8.50	94,000	100,000	None
Richmond Lt & R. R. Co. (Staten Island) Rochester, Corning & Elmira Trae, Co.	1920	32.05	{(15) 1,932,000	(13) 1,482,000	None
(Rochester)	1912 1908	30.02	271,000 1,862,000	1,000,000 5,720,000	3,140,000
Shore Line Elec. R. R. Co. (White Plains)	1920	1 46	50,000	None	None
Staten Island Midland Ry, Co. (N. Y.)	1920	28.68	1,000,000	1,000,000	3,000
Steinway Ry Co. (Long Island City) (16) Westchester St. R. R. Co. (White Plains).	1922 1920	26 00 21.60	700,000	1,500,000 168,000	None 47,400

companies, with the exception of two, previously mentioned, are practically all quite small companies, forced into bankruptcy through decreased earnings. The total amount of track mileage and securities in default represents, therefore, a promising decrease when compared with a corresponding table for 1921. It is true that the Brooklyn Rapid Transit Company, the United Railways of St. Louis and the Pittsburgh Railways are still in the hands of the receivers, but notable efforts have been made toward straightening out the affairs of these three large companies. In the case of the Brooklyn Rapid Transit Company, a reorganization is hoped for early in 1923 and the receiverships are

NOTES

NOTES

1—Sold at foreclosure during 1922.
2—Included in that of Atlantic Shore Italiway.
3—To be sold for junk.
4—Sold and reorganized as Chicago, Aurora & Elgin R.R. Co. in 1922.
5—Road has been dismantled.
6—Receiver discontinued August, 1921.
8—Removed from last year's list because of reported foreclosure sale, set aside by the court. Final foreclosure 1922.
9—\$68,160 in car trust certificates.
10—No bonds issued. Cost of construction carried by temporary notes.
11—Reported sold prior to 1922.
12—These figures exclude track and securities of formerly controlled companies which have been returned to their owners.
13—Figures cover only proportion of securities represented by railway property. Estimated at 67.4 per cent of total.
14—This company is reported as having had right-of-way, but no track built.
15—Receivership lifted during 1922. Not operating now.

Not operating now.

Part of New York & Queens County
Ry., which is not otherwise involved.

Ry., which is not otherwise involved.

Road has discontinued operations and is now being dismantled.

Reported sold, but sale not yet confirmed.

Broadway and Seventh Avenue Railrond and Sixth Avenue Railrond and Sixth Avenue Railrond, operated by the New York Railways, are also in receivership.

Sold during 1922.

Notes, bank loans and \$85.050 in car trust certificates included in funded debt.

Figures cover iotal combined property. \$38,553 in car trust certificates included in funded debt.

At the close of 1922 a reorganization plan eliminating the Interborough-Consolidated Corporation securities was practically but not completely consummated.

Receivership lifted during 1921.

Receivership, which was limited to Chattanooga lines only, was lifted during 1922. Now owned by Tennessee Electric Power Company.

Figures cover total combined propperty. Railway value cannot be separated.

perty. R separated.

separated.

-Underlying railway bonds only.

-Property is being disintegrated and reorganized.

-Sold and now being operated by the Union Traction System.

-Sold and reorganized, but receiver not yet discharged.

-Stock has no par value. Nominal value given.

-As included in last year's report.

No new information received.

-Balance remaining after separation of Third Itali Division.

likely to be terminated in the two other cases before the end of this year. There are, to be sure, many legal and financial problems to be settled, but the increase in the net earnings, attributed to better economic conditions and improved operating methods, has made the terminating of the receiverships a practical question. Moreover, a growing appreciation has been shown on the part of security holders of the fallacy of too stringent insistence upon mortgage rights where such insistence may mean the disintegration of a system and destruction of earning power that inheres in the operation of a single

system. It is in New York City itself where a large part of the securities and mileage are in receivership. Nevertheless, the situation during the past year has improved considerably due to the reduced cost of labor, increased traffic, and in the case of the surface lines, a virtual increase in the fare, brought about by the break-up of some of the systems. Moreover, the situation will be materially relieved by the extinguishing of all of the \$63,808,000 of 4½ per cent Interborough-Consolidated bonds, all of the \$45,-740,500 of preferred stock of that company and all the common stock, which at \$5 nominal rating a share would be valued at \$4,663,134. This reorganization plan was practically completed on Dec. 31, 1922. The reflection of this improved condition of financial affairs in New York City is also to be seen in the higher quotations for all traction securities. In the case of the Interborough Rapid Transit Company, the threatened receivership has been avoided and the condition of the company materially improved as a result of the rearrangement of the terms of lease under which it operates the Manhattan Elevated Lines.

Of the interurban properties in the hands of the receivers, both the Aurora, Elgin & Chicago Railroad Company and the Cleveland, Southwestern & Columbus Railroad Company are being reorganized in a rather drastic manner. In the former case, the Third Rail Division was sold and reorganized as the Chicago, Aurora & Elgin Railroad and is now being so

Table V (Continued)—Electric Railway Receiverships and Foreclosures as of Dec. 31, 1922

	as of I	Dec. 31,	1922		
	ear of	Miles of Single	Ou	tstanding Securit	ties
	Receiv-	Track Involved	Capital Stock	Funded Debt	Receivers' Certificates
OHIO	Столь	xa voi i cu	Stock	2500	Cortmoure
Ashtabula Rapid Transit Co. (Ashtabula) (Cincinuati Lawrenceburg & Aurora Elec.	1)1920	5.50	500,000	382,000	7,500
St. Ry. (Cincinnati). Cleveland, Alliance & Mahoning Valley	1913	31.89	808,900	750,000	None
R. R. Co. (Ravenoa)	1920	46.00	1,100,000	1,100,000	8,000
(Cleveland). Dayton, Covington & Piqua Trac. Co.	1922	209.00	6,648,000	3,510,000	None
(West Milton) Gallipolia & Northern Traction Co.	1922	38.00	1,150,000	550,000	None
(Gallipolis) Interurban Ry. & Terminal Co. (Cincia-	1922	5.00	20,000	48,000	None
nati (17) Ohio Electric Ry. (Springfield) (28)	1914 1921	47.55 82.90	3,500,000 11,000,000	1,650,000 7,254,2 00	None None
Columbus, Newark & Zanesville Elec.		95.85	2,025,000	4,704,000	None
Ry. (Springfield) (6) Fort Wayne, Van Wert & Lima Trac. Co. (Lima)	1921	61.63	1,000,000	1,470,000	None
Co. (Lima)	1921	257.20	4,025,000	7,900,000	200,000
Obio River Electric Ry. & Pwr. Co. (Pomeroy)	1919	12.70	300,000	315,000	None
Maumee Valley Ry, & Lt. Co. (Toledo) Springfield Terminal Ry, & Pwr. Co.	1921	23,21	1,000,000	800,000	None
(Springfield) (1) (8) Toledo & Western R. R. Co. (Sylvania)	1919 1921	30.00 89.00	350,000 2,000,000	250,000 2,000,000	18,683 None
PENNSYLVANIA Bangor & Portland Trac. Co. (Bangor)	1922	8.70	130,000	130,000	3,000
Buffalo & Lake Erie Trac. Co. (Erie) Cleveland & Erie Ry. (Girard) (3)	1915 1920	168.00 30.00	7,500,000 300,000	7,066,000 1,000,000	920,000 None
Ephrata & Lebanon St. Ry. Co. (Lebanon) North Branch Transit Co. (Bloomsburg)	1921 1915	24.00 30.00	189,000 500,000	250,000 532,500	None None
Northampton, Easton & Wash. Trac. Co.	1919	17.80	1,250,000	739,000	15,000
(Easton) (18). Philadelphia Rys. Co. (Philadelphia) (6) Pittsburgh Rys. (Pittsburgh). Pottatown & Phoenixville Ry. (Potts-	1919 1918	16.00 598.76	400,000 21,726,750	400,000 52,185,133	None None
town) (1)	1922 1922	15.00 18.00	500,000 36C,000	114,600 400,000	None 21,000
Sunbury&Susquehanna Ry. (Sunbury) (3:		9,20	600,000	640,000	None
Summary Total 1/1/22. Net changes and corrections. Receiverships added during 1922	51 cos. 5 cos.	3,025.70 . 116.01	226,585,599 12,660,858	371,135,013 1,795,335	24,410,526
Receiverships added during 1922 Less properties sold or reorganized	11 cos.	660.09	17.258.000	20,108,400 15.205.600	5,637,443 24,000 117,683
Net receiverships 12/31/22		484.07 3,367.73	10,709,850 245,795,107	377,833,148	117,683 [18,679,400
South of the	e Ohio a	nd East	of the Missis	sippi	
ALABAMA Birmingham Ry., Lt. & Pwr. Co.					
(Birmingham)	1919	153.55	4,232,800	(13) 8,767,044	(13) 414,021
(Birmingham)	1919	32,63	325,000	1,500,000	18,000
(Montgomery)	. 1919	38.00 7.63	(£6) 2,000,000 75,000	(£6) 1,430,000 225,000	(26) 250,000 None
FLORIDA	1010	(4.00	1 500 000	(84) 4 122 050	(2.500
Jacksonville Trac. Co. (Jacksonville) Pensacola Elec. Co. (Pensacola)		64.00 24.49	1,500,000 (££) 1,100,000	(21) 4,122,050 (22) 1,780,453	62,500 (22) 25,000
NORTH CAROLINA					
Asheville & East Tennessee R. R (Asheville) (1)	1922	6.34	70,000	35,000	None
SOUTH CAROLINA					
South Carolina Lt., Pwr. & Rys. Co (Spartanburg) (1)		21,00	3,200,000	4,629,000	None
	. 1/21	211.00	3,200,000	1,027,000	210110
TENNESSEE Chattanooga Ry. & Lt. Co. (Chatta	-				
nooga) $(\overline{x}b)$. 1919 . 1919	69.00 132.76	(<i>£6</i>) 5,000,000 5,000,000	(£7) 2,790,000 8,025,000	None None
WEST VIRGINIA				***	
Morgantown & Wheeling Ry. Co	. 1916	27.00	345,000	500,000	214,000
Summary Total 1/1/22	. 10 cos.	565.70	22,775,000	33,015,400	1,060,060
Net changes and corrections	. l cos.	4.36 6.34	2,800 70,0 00	753,147 35,000	76,539 None
Less properties sold or reorganized Net receiverships 12/31/22	. 4 cos.	103.97 472.43	8,345,000 14,502,800	7,679,000 26,124, 54 7	983,521
		f the Miss		•	,
ARIZONA	west o	i the miss	ıqqıaaı		
Tucson Rapid Transit Co. (Tucson) (6).	. 1919	4.35	500,000	114,800	None
ARKANSAS West Helena Consolidated Co. (Helena	a) 1921	5.50	469,975	None	None
COLORADO Denver Tramway Co. (Denver)	. 1920	226.42	6,156,300	17,555,585	None
IOWA	. 1740	220.72	5,150,500	,,-	110/16
Des Moines City Ry. Co. (Des Moines)	6) 1918	94.00	1,305,000	5,981,000	10,000

operated. The Cleveland, Southwestern & Columbus Railroad Company, which did not go into receivership until this year, has submitted to a plan whereby the securities are to be scaled down within the limits of the company's earning power. A segregation of the various lines which made up the system of Ohio Electric Railroad Company is being made. The Columbus, Newark & Zanesville Electric Railroad Company, formerly operated by the Ohio Electric Railroad Company, reports the discharge of the receiver. Certain bonds of the Michigan United Railways have been in default for some time and the appointment of a receiver for that company was not, therefore, wholly unexpected. Already a reorganization plan has been worked out whereby the outstanding securities are to be scaled down within the limits of the company's earning power. As the earnings of the first ten months of this year are reported to be sufficient to pay the new bond interest 1.55 times, it is hoped that the receiver will be discharged early in 1923.

During the past year thirteen companies have been sold or reorganized. One now undergoing reorganization is the Cleve-

land, Southwestern & Columbus Railroad Company, previously mentioned. It was the second large Ohio company to go into receivership during the past two years. In an official statement issued by the counsel concerning the receivership, it was stated that the company was unable to pay the bond interest because of extreme loss in gross operating revenues, resulting from unfavorable economic and industrial conditions. Another reorganization now in process is the New Orleans Railway, Light & Power Company, which has successfully carried through a plan whereby the interests of the city and the company are both well protected for the future. The city, moreover, will gain very largely through the money put back into the property for improvements. Of those companies which have been sold and reorganized, the Ashtabula Rapid Transit Company, Ashtabula, Ohio, is also of interest as it represents an experiment in municipal ownership, having been purchased by the city in April, 1922, for \$150,000. The La Fayette Service Company, forced to sell through jitney bus competition, has been purchased by the La Fayette Street Railway Company. Although these companies have been forced to sell at foreclosure, it augurs well for the future of the industry that new capital has been found to take them over and service will not be suspended.

Eight companies have been sold for junk during 1922. In many cases the suspension of service and subsequent total abandonments were due to the increased number of private automobiles, which rendered electric railway

Table V (Concluded)—Electric Railway Receiverships and Foreclosures as of Dec. 31, 1922

	as 01	Dec. 51,	1922				
	Miles of			Outstanding Securities			
Name of Company	Year of Receiv- ership	Single Track Involved	Capital Stock	Funded Debt	Receivers' Certificates		
KANSAS							
Manhattan City & Interurban Ry (Manhattan) (29) Southwestern Interurban Ry, (Winfield)	1922	16.00 25.00	612,150 150,000	90,000 None	None None		
LOUISIANA							
New Orleans Ry. & Lt. Co. (New Orleans) (30)	1919	222,12	(26) 30,198,850	(#6) 38,361,200	1,180,000		
MINNESOTA							
St. Paul So. Elec. Ry. Co. (Hastings)	. 1918	17,54	658, 225	425,400	None		
MISSOURI							
Kansus City, Lawrence & Topeka R F Co. (Kansas City) Kansas City, Outer Belt Elec. R. R. Co	. 1919	12.00	250,000	400,000	None		
(Kansas Čitv) (32)	. 1912	(14)	None	1,298,000	100,000		
Kansas City, Ozark & So. Ry. (Ava.) (32		15.00 314 88	300,000	None 30,032,336	None None		
Kansas City Railways (Kansas City) Missouri Elec. R. R. Co. (St. Louis)	1919	18.83	1,000,000	700,000	None		
United Rys. Co. of St. Louis		460.78	41,296,000	50,690,000	4,200,000		
OREGON							
Southern Oregon Trac. Co. (Medford)(11) 1918	8,19	150,000	150,000	None		
TEXAS							
Austin St. Ry. Co. (Austin)	1921	22.67	810,000	786,000	None		
Bryan & Central Texas Interurbar (Bryan) (1)		27.20	300,000	300,000	None		
Bryan & College Interurban Ry. (Bryan)	1920	7 75	40,000	100,000	None		
Corpus Christi Ry. & Lt. Co. (Corpus Christi) (24)		9.75	None	(26) 1,694,507	14,539		
Standard Trac. Co. (Dallas)		1.50	10,000	None	None		
Summary							
Total 1/1/22			82,884,375	148,536,620	5,544,539		
Net changes and corrections		6.54 16.00	809,975 612,150	52,208 90,000	40,000 None		
Less properties sold or reorganized			2,867,150	8,330,307	24,539		
Net receiverships 12/31/22			81,439,350	140,348,521	5,480,000		
	R	ecapitulati	on				
Total 1/1/22			337,055,774	565,400,554	31,125,125		
Net changes and corrections	, 6 cos.	126.04	13,593,633	1,615,081	5,733,982		
Receiverships added during 1922			18,140,150	20,304,400	24,000		
Less properties sold or renrganized Net receiverships 12 31/22	. 25 cos. 85 cos.	719.53 5,550.78	22,171,500 346,618,057	31,474,907 552,614,966	1\$2,222 25,272,921		
Net receiverships 12 71/22	02000	2,270.70	240,010,077	>>2,01.1,00			

service by those companies impracticable. A notable instance of the results of such competition is the Joliet & Eastern Traction Company, Joliet, Ill., which was abandoned and sold for junk. The Gallipolis & Northe n Traction Company reports a suspension of operations and the intention to dismantle entirely. It is hoped that in the case of the Asheville & East Tennessee Railroad Company, service may be resumed by the taking over of the properties by a new company. Of these companies, four have gone into receivership during the past year. It is especially interesting to note that during 1922 increased earnings have enabled six companies to terminate the receivership. Of these, the Chattanooga Railway & Light Company has been reorganized as the Tennessee Electric Power Company. The Shore Line Electric Railroad Company of White Plains, N. Y. (1.5 miles), which went into the hands of a receiver in 1920, reports that it is no longer in receivership but is awaiting a court order pending dissolution.

The list of abandonments of parts of lines, to be found in Table VI, has been tabulated this year to show both city and interurban mileage. Statistics for 1921 showed a total mileage of 149.61 of track abandoned by the 71 companies listed. The past year, however, shows a total of 110.53 miles of city track and 105.09 miles of interurban track, making a total of 215.62 miles abandoned by 97 companies. In many instances, however, the abandonment is due to a change in route or elimination of unused sidings, turnouts and other short pieces.

Table VI—Abandonments—Partial—1922

(Includes all pieces of track, aidings, yards, etc., permanently abandoned-Companies arranged alphabetically by states)

	-M	iles-		—N	Iiles
	City	Inter- urban		City	Inter- urban
Polonifold & Word Floring Co. (P. 1. C. 14 C. 1)		uroan	Y A CONTRACT OF	0.91	6.31
Bakersfield & Kern Elec. Ry. Co. (Bakersfield, Cal.)	0.48 0.23		International Ry. Co. (Buffalo, N. Y.)	0.91	0.31
Pacific Electric Ry. Co. (Los Angeles, Cal.) Peninsular Ry. Co. (San Jose, Cal.)	0.23		New York State Rys.: Rochester lines	1.64	
Petaluma & Santa Rosa R.R. Co. (Petaluma, Cal.)	0.95	0.05	Syracuse lines.	0.05	
San Francisco-Oakland Terminal Rys. (Oakland, Cal.)	0.09	0.11	Uties lines		
Southero Pacific Co. (San Francisco, Cal.)		0.90	Utica linea Rochester & Syracuse R.R. Co. (Syracuse, N. Y.)		0.73
Denver & Interurban R.R. Co. (Denver, Colo.)		2.75	Syracuse & Suburban R.R. Co. (Syracuse, N. Y.)		0.47
The Connecticut Co. (New Haven, Conn.)	0.19		Third Ave. Rv. System (New York, N. Y.)	17.49	
Danbury & Bethel St. Ry. Co. (Danbury, Conn.)	2.50		Cincinnati Traction Co. (Cincinnati, O.)	0.84	
The Shore Line Electric R.R. Co. (Norwich, Conn		28.22	City Ry. Co. (Dayton, O.)	0.58	12123
Grand River Valley Ry. Co. (Grand Junction, Colo.)	12122	0.06	Columbus, Delaware & Marion Elec. Ry. Co. (Columbus, O.)	*	6.21
Southern Colorado Power Co. (Pueblo, Colo.)	0.34		Community Traction Co. (Toledo, O.)	2.82 1.21	
Trinidad Electric Transmission Ry. & Gas Co. (Trinidad, Colo.) Western Light & Power Co. (Boulder, Colo.)	3.00		Northern Ohio Traction & Lt. Co. (Akron, O.)	2.00	
Augusta-Aiken Ry. & Elec. Corpn. of S. Carolina (Augusta, Ga.)	0.43 0.61		Allegheny Valley St. Ry. Co. (New Kensington, Pa.)	2.07	
Georgia Ry. & Power Co. (Atlanta, Ga.)	0.20	1.68	Altoona & Logan Valley Elec. Rv. (Altoona, Pa.)	0.21	
Macon Ry. & Lt. Co. (Macon, Ga.)	0.20	2.63	Buffalo & Lake Erie Traction Co. (Erie, Pa.)	2.24	0.26
Boise St. Car Co. (Boise, Idaho)	0.75		Chambersburg & Gettysburg Elec. Ry. Co. (Chambersburg, Pa.).	0.45	
Alton, Granite & St. Louis Traction Co. (Alton, Ill.)	0.09		Citizens' Traction Co. (Oil City, Pa.)	0.26	
Chicago & Joliet Elec. Ry. Co. (Joliet, Ill.)	1.72		Coatesville Trolley Co. (Coatesville, Pa.)	11111	5.00
Chicago Surface Lines (Chicago, III.)	0.26		Harrisburg Rys. Co. (Harrisburg, Pa.)	0.73	
La Fayette St. Ry. Co. (La Fayette, Ind.)	0.60		Jefferson Traction Co. (Punxsutawney, Pa.)		7.00
Albia Lt. & Ry. Co. (Albia, Ia.)	6.00		Johnstown Traction Co. (Johnstown, Pa.)	0.04	0.24
Dea Moinea City Ry, Co. (Dea Moines, Ia.)	0.10 0.64		Lehigh Traction Co. (Hazleton, Pa.)		1.12
Tri-City Ry. Co. of Iowa (Davenport, Ia.) Kentucky Traction & Terminal Co. (Lexington, Ky.)	0.84		Northwestern Pennsylvania Ry. Co Philadelphia Rapid Transit Co. (Philadelphia, Pa.)	2.48	1.12
Louisville Ry. Co. (Louisville, Ky.)	1.18		Pittsburgh Rys. Co. (Pittsburgh, Pa.)	3.25	
New Orleans Public Service Co. (New Orleans, La.)	1.55		Vallamont Traction Co. (Williamsport, Pa.)	0.17	
Cumberland County Power & Light Co. (Portland, Me.)	0.26		West Penn, Rys. Co. (Pittsburgh, Pa.)	0.10	0.28
United Rys. & Electric Co. (Baltimore, Md.)	0.70		Charleston Consolidated Rv. & Ltg. Co. (Charleston, S. C.)	0.47	
Berksbire St. Ry. Co. (Pittsfield, Mass.)		0.83	Columbia Ry., Gas & Elec. Co. (Columbia, S. C.)	2.00	
Boston Elevated Ry. Co. (Boston, Mass.)	1.40	1111	Memphis St. Ry. Co. (Memphis, Tenn.)	0.84	
Connecticut Valley St. Ry. Co. (Greenfield, Mass.)	11112	8.96	Brownsville St. & Interurban R.R. Co. (Brownsville, Tex.)	1.00	0.26
Eastern Massachusetts St. Ry. Co. (Boston, Mass.)	1.16	10.81	Northern Texas Traction Co. (Fort Worth, Tex.)	0.86	0.20
Massachusetts Northeastern St. Ry. Co. (Haverhill, Mass.)	0.01	1.89 6.44	San Antonio Public Service Co. (San Antonio, Tex.)	4.29	0.46
Benton Harbor-St. Joe Ry, & Lt. Co. (Benton Harbor, Mich.).	0.25		Puget Sound Elec. Ry. (Tacoma, Wash.).	0.38	
City of Detroit—Dept. of St. Rys. (Detroit, Mich.)	0.42		Puget Sound International Ry. & Power Co. (Everett, Wash.)	0.08	
Detroit United Ry. (Detroit, Mich.)	1.18		Seattle Municipal St. Ry. Co. (Seattle, Wash.)	1.47	
Grand Rapida Ry. Co. (Grand Rapids, Mich.)	0.24		Spokane United Rys. (Spokane, Wash.)	21.05	
Twin City Rapid Transit Co. (Minneapolis, Minn.)	0.01	0.03	Walla Walla Valley Ry, Co, (Walla Walla, Wash.)	2.00	11111
Wisconsin Ry., Lt. & Pwr. Co. (Winona, Minn.)	0.26		Yakima Valley Transportation Co. (North Yakima, Wash.)		0.01
Meridian Lt. & Ry. Co. (Meridian, Miss.)	1.50		Charleston Interurban R.R. Co. (Charleston, W. Va.)	0.69	0.13
St. Joseph I.t. Ht. & Pwr. Co. (St. Joseph, Mo.)	1.13		Milwaukee Elec. Ry. & Lt. Co. (Milwaukee, Wis.)	1.50	0.12
Springfield Traction Co. (Springfield, Mo.)	0.75		CANADA Kitchener & Waterloo St. Ry. Co. (Kitchener, Ont.)	0.80	
United Rya. Co. of St. Louis (St. Louis, Mo.) Lincoln Traction Co. (Lincoln, Neb.)	0.08 2.16		Toronto Transportation Commission (Toronto, Ont.)	0.49	
Bridgeton & Millville Traction Co. (Bridgeton, N. J.)	2.10	10.00	Montreal Tramways Co. (Montreal, Que.)	0.90	
Treeton & Mercer County Traction Corp. (Trenton, N. J.)	0.04	10.00	British Columbia Elec. Ry. Co. (Vancouver, B. C.)		1.26
Interborough Rapid Transit Co. (New York, N. Y.)	0.03				
				110.53	105.09

The majority of electric railway companies still in receivership are now reporting more satisfactory earnings and there is every indication that the coming year will see the discharge of many receivers. The city lines show a greater improvement relatively than the interurban companies. The readjustment of fares to a reasonable and profitable basis, reduced operating costs and improved methods are all factors which have helped to bring about a more healthy condition of the industry. Owing to the unreasonable interest rate for money, only imperative financing has been done during the past few years. However, the gradual lessening of the interest rate is a promising factor which will make possible the handling of present and future business, to a greater advantage and at a relatively smaller cost. With credit being restored, the railways can now confidently look forward to securing long-needed new capital for additions and economy-producing improvements.

TABLE VII—SUSPENSIONS OF SERVICE—1922

(Includes miles of track on which companies have ceased to operate, but which have not been permanently shandoned or ripped up.)

Miles
Columbus Flee & Par Co (Columbus Ga.)

Columbus Elec. & Pwr. Co. (Columbus, Ga.)	. 0.50
Louisville Ry. Co. (Louisville, Ky.)	. 4.33
Eastern Massachusetta St. Ry. Co. (Boston, Mass.)	
Grand Rapids Ry. Co. (Grand Rapids, Mich.)	
Saginaw-Bay City Ry. Co. (Saginaw, Mich.)	
Kansas City Rys. Co. (Kansas City, Mo.)	1.72
Bridgeton & Millville Traction Co. (Bridgeton, N. J.)	2.00
International Railway Co. (Buffalo, N. Y.)	14.79
Syracuse & Suburban R.R. Co. (Syracuse, N. Y.)	0.65
Community Traction Co. (Toledo, O.)	
Coneatoga Traction Co. (Lancaster, Pa.)	
West Penn. Rya. Co. (Pittaburgh, Pa.)	
Puget Sound International Ry, & Power Co. (Everett, Wash.)	
Walla Walla Valley Ry. Co. (Walla Walla, Wash.)	
Total for 1922 (14 companies)	111 69

Hauling Wagons with Electric Cars

THE accompanying illustration shows a wagon mechanism which has been developed by the Berlin Street Railway, so that heavy loads can be hauled on the rails throughout the city by electric cars, thus doing away with the necessity for horses which are scarce.



Wagon for Use Either on Track or Pavement

When the wagon is hauled over the rails, the large wheels used for transporting over pavements are raised and the small flanged wheels on either side of the larger wheels take the load and follow the track. The wagon can be raised and lowered through a mechanism operated by hand levers.

Statistics Showing Extent of the Industry

Number of Operating Companies, Miles of Tracks, Number of Cars and Buses Comprised in Electric Railway Field in 1922

AS IN PREVIOUS years the ELECTRIC RAILWAY JOURNAL has again compiled statistics of the miles of track and type of rolling stock of the electric railway companies in the United States to compare with a similar table which was published on page 41 of the JOURNAL for Jan. 7, 1922. This information was obtained from the August, 1922, "Electric Railway Directory" of the McGraw-Hill Company and is indicative of the conditions as they existed about July 1.

The country has been divided into the same geographical divisions for the purpose of comparisons, but two changes have been made in the form of the table. The principal one is to include a column giving the total number of cars in each state. The other is to add a column of buses owned. A few changes have been made in the totals for 1921, as reported last year, because of additional information received and the discovery of some errors in the calculation.

Although, according to these statistics, there has been a slight decrease in number of companies, miles of track and number of cars reported, this does not mean that there has been a decrease in the number of cars and miles of track operated. At least some of the decrease is due, in the opinion of the compiler, to the decision of several companies during the last year no longer to include in their reports equipment whose use was given up some time ago.

In this connection a word of caution should be said against too great reliance on the figures of this and previous tables as giving the exact status of the industry from year to year. The only claim made for these tables is that they are compilations from the directories, and in these compilations some assumptions have had to be made in regard to proportioning track and cars between lessor and lessee companies, holding and subsidiary companies, etc. But the same compiler has prepared the tables for the last three years and the same bases for estimating these divisions have been followed each year. Other bases assumed in the compilation of the table were explained in connection with the article in the Statistical Number of 1922.

According to the table there has been a decrease of eleven companies and 406 miles of track in June, 1922, as compared with June, 1921. Of these 406 miles, 116 belonged to the eleven companies which had entirely suspended operations, so that only 290 miles belonged to companies still in business.

During the same period the rolling stock decreased 869 after allowance for the seventy-seven cars belonging to the eleven companies which suspended operations.

Figures elsewhere in this issue show that the cars purchased or built this year greatly exceed those purchased or built in 1921, but as already explained probably there has been a greater writing off from inventories of old equipment.

The column of bus data, it should be remembered, is for July, 1922. Later figures published in *Bus Transportation* show that by September, 1922, the number of buses owned by electric railway companies had increased to 345.

There seems to be a slight tendency toward the use of the trailer by electric railway companies, and it seems that the passenger motor cars are suffering in number as a consequence. The increase in the former amounts to 1,482 over 1921, while at the same time the latter has decreased over last year by 2,479.

STATISTICS OF CARS, BUSES AND TRACK OPERATED BY ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES IN JULY, 1922

State	No. of Companie Operating	Miles of Single Track	Passo Cai	rs-	Electric Locomotives	Motor	Trailor era	Service Cars	Other Cars	All Cars	Buses Owned by Electric Railways
New England States Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont	8 14 30 11 4 7	1,618.42 527.42 2,775.60 243.85 425.83 98.00	1,696 456 5,282 303 1,056 108	75 10 267 46 4	108 9 12 1 3 4	63 45 61 4 32	18 82 8 1 46	281 94 883 25 175	1 38 87 15 5	2,242 734 6,600 349 1,363 144	30
Total	74	5,691.12	8,901	402	137	216	156	1,473	147	11,432	37
Eastern States Delaware D. of Columbia Maryland New Jersey New York Pennsylvania Virginia W. Virginia	1 10 25 189 04 13 15	141.80 377.68 704.52 1,540.30 5.433.66 4,588.19 447.27 624.38	188 1,091 2,055 3,261 17,266 7,502 859 499	107 277 59 107 2,050 521 64 14	11 2 130 5 3	3 5 5 22 111 155 16 19	29 48 1 64 104 32 30	35 108 30 350 1,716 974 53 37	38 41 507 207 5	333 1,516 2,246 3,784 21,844 9,468 1,037 659	52 2 5 3
Total	263	13,857.60	32,721	3,199	176	336	308	3,303	839	40,882	65
Central States Illinole. Indians. Iowa. Kentuekv. Michigan. Minnesota. Missouri. Ohlo. Wisconsin.	58 28 23 7 24 13 22 63 16	3,528.09 2,328.17 957.07 493.38 1,819.42 769.06 1,143.89 4,040.01 765.50	5,784 1,790 792 781 2,715 1,252 2,513 4,291 1,038	892 230 53 62 300 8 255 583 125	60 12 39 22 6 4 29 7	36 50 24 16 128 46 19 258	2,146 482 421 10 200 26 360 27	656 148 80 148 196 24 332 557 337	88 218 141 8 306 94 54 330 21	9,667 2,930 1,550 1,025 3,867 1,430 3,203 6,408 1,566	3 3 2 2 2 15 34
Total	254	15,844.59	20,956	2,508	179	588	3,672	2,478	1,260	31,641	62
Southern Stotes Alabama Arkansas Florida Georgia Louisiana Mississippl North Carolina South Carolina Tennessee Total	12 8 7 11 8 7 11 4 10	360.74 176.26 197.41 479.17 309.50 94.79 382.48 128.65 2,516.83	443 225 321 625 670 109 314 152 701	130 19 11 45 47 20 23 11 68	3 1 18 1 25	. 6 10 7 8 6 7 55	82 6 20 12 1 167 13 302	58 18 20 44 109 4 30 5 36	17 3 	739 272 382 761 837 137 567 182 859	i i 2
Western States Arizona. California. California. Calorado. Idaho. Kaneas. Montana. Nebraska New Mexico. North Dakota. Oklahoma Oregon. South Dakota. Texas. Utah. Washington. Vyomlog.	3 36 12 3 14 7 5 11 15 10 3 15 15 15 15	43 79 3,281 74 470 15 100 70 514 69 847 30 854 65 7 50 10 95 25 79 357,61 3 26 60 1,005 82 465 75 1,099 22 00	3,796 3,88 35 382 117 556 5 16 13 13 716 216 1,260 13	481 150 39 26 63 23 12 92 111 45 98 1	73 8 2 90 3 3 7 22 21 28	63 12 25 20 4 2 4 180	1,640 156 4 118 5 107 446 2 133 244 750	3 565 112 4 30 15 63 8 8 8 8 18 24 97 13 78	1111 6 114 31 39 211 32 4	52 6,729 832 6,605 253 3689 5 166 82 4,54 1,493 1,641 7,60 2,244 19	18 18 14 12 123
Total 11. S. 1977 Total 11. S. 1971.	158 827 838	9,239 73 47,149 87 47,555 23	9,304 75,442 77,921	1,141 7,624 6,142	772 760	1.375 1,324	3,465 7,903 7,712	1,183 8,761 7,005	2,795 4,754	15,981 104,672 105,618	300 129

As has been explained previously, unless the same official reports the cars each year, there is bound to be some discrepancy in the division of cars into "freight" service and "other" cars. The terms are more or less ambiguous and interchangeable, but it has been the purpose of the compiler to classify as much as possible the column "other" cars and he has succeeded further this year. This column has been diminishing as follows: the 1919 table reported 10,144 "other" cars, the 1920 table 6,899; 1921, 4,754, and now in 1922 the figure has been reduced to 2,795 cars. As a result of this decrease the freight, and express, both motor and

trailer, and the service cars have increased. It is worthy of note that the number of electric locomotives is always on the increase. The policy of eliminating trailer freight cars of companies operating a large percentage, in comparison to other types of cars, has been continued this year.

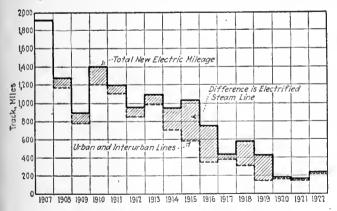
In the Jan. 7 issue of last year of the Journal there was produced on page 42 a graphical chart of the rolling stock as operated in the various states in 1921. This chart would apply for 1922, as the conditions have not changed enough to warrant any marked adjustments on the map.

Track Extensions and Reconstruction Work Increased

The Amount of New Track Built During the Past Year Showed a Small Increase Over that Reported for 1920 and 1921 — Track Reconstruction Shows a Considerable Increase — More Miles Were Rebuilt During 1922 than in Any Year Previously Recorded

THE following tables give statistics of track built and rebuilt during the year 1922 and show that very little new construction has been undertaken, but that track forces have been particularly active in reconstructing old lines. While the amount of new track constructed exceeds that reported for the years 1920 and 1921, still this remains at the low level that has existed since 1916. The mileage reported for urban and interurban track extensions during the year 1922 for the United States and Canada is 211.38. This is divided: 126.27 miles for city lines and 85.11 miles for interurban lines. Few additions of any considerable extent were carried out, and practically all of the increased mileage is made up of spurs and short extensions.

Electrification of steam lines was also at a standstill during 1922. The extensions reported amount to but



Miles of Track Built by Years Since 1907

12.35 miles, which is slightly greater than that reported for the years 1920 and 1921. The fact that electrified steam lines have added very little mileage during the past three years makes these totals in comparison with totals for previous years seem very low.

While new track extensions have been at a standstill, railway track forces have been kept busy by a large amount of reconstruction. A total of 212 railways

report reconstruction as having been carried out during the past year, and they report a total of 739.70 miles reconstructed. This is greater than for any year since the JOURNAL began compiling this information, the largest amount previously reported being that for last year, when 615.21 miles were reconstructed.

The accompanying chart and tables give a comparison of new track extension by years since 1907. The shaded area in the chart represents the amount of electrified steam line extensions, which has dropped to

SUMMARY O	F TRA	.CK C	ONSTRU	JCTION	v FOR	1922	
	New England District	North of the Ohio and East of the Mississippi	South of the Ohio and East of the Mississippi	West of the Mississippi	Total for United States	Canada	Grand Total
	Tr	ack Ext	ensions				
Number of companies	13	41	10	33	95	9	104
Miles of track Urban Interurban	7.45 3.63	30.33 21.52	11.17 2.04	39.23 57.92	88.18 85.11	38.09	126,27 85.11
Total track extensions	11.08	51.85	13.21	97.15	173.29	38.09	211.38
	Tra	ck Reco	nstructio	on			
Number of companies	25	92	29 t	53	196	16	212
Miles of track Urban Interurban	94.80 53.20			145.89 23.67	527.14 154.95	57.61	584.75 154.95
Total track rebuilt	148.00	314.61	49.92	169.56	682.09	57.61	739.70

	Exte	nsions		
Urban Track	Interurban Track	Electrified Steam Lines	Total	Track Rebuilt
(a)	(a)	*****	1,880.00	(a)
1,1	74.5			(a)
7	74.7			(a)
				(a)
1, 1	05.0			(a)
	169.4			(a)
ç	74.9			(a)
7	16.5			(a)
-	96.0			(a)
115.40	240.90			(a)
251.10				375.40
216.41				155.43
110.90				390.64
145.69				361.77
108.15	38,95	8.08		615.21
126.27	85.11	12.35	223.73	739.70
	Track (a) 1,1 7 1,2 1,1 8 2 115.40 251.10 216.41 110.90 145.69	Urban Interurban Track (a) 1.174.5 774.7 1,204.8 1,105.0 869.4 974.9 716.5 596.0 115.40 2216.41 110.90 229.67 145.69 130.87 108.15 38.97 108.15 38.97 1240.27 85.11	Urban Track Interurban Track Electrified Steam Lines (a) 1.174.5 384.00 774.7 112.04 112.40 1,105.0 86.50 86.50 869.4 80.80 80.80 974.9 119.00 119.00 716.5 229.00 448.20 155.10 125.60 66.00 216.41 97.41 275.70 110.90 29.67 287.60 145.69 30.87 8.92 108.15 38.95 8.08 126.27 85.11 12.35	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

COMPARISON OF TRACK CONSTRUCTION

Statistics of Track Built and Rebuilt During 1922

5	eatt:	sucs of	1 rac	K Dunt a	and Rebuill During 192.				
NEW ENGLA					Railway		ion s, Miles Interurban		lt, Miles nterurban
Railway		isions, Miles Interurban		uilt, Miles Interurban	Rochester & Syracuse R.R. Co		0.61		
Connecticut					Southern New York Pwr. & Ry. Corp., Oneonta			0.34	0,50
The Connecticut Co., New Haven The Shore Line Elec. Ry. Co., Norwich.		0,39 1.26	27.73	2.91 0.56	Oneonta. Second Ave. R.R. Syracuse & Eastern R.R. Co. Syracuse	0.04		7.06	0.47
Maine				4 00	Third Ave. Ry. Co., New York United Traction Co., Albany	1.36		7.06	
Aroostook Valley R.R. Co., Presque Isle The Androscoggin & Kennebec Ry. Co.,		* * * * *		4.00	Ohlo			1.00	
Bangor Ry. & Elec Co., Bangor.,	1.95	0.05	0.14	1.50	Ashtabula Rapid Trans. Co., Ashtabula Cincinnati & Dayton Trac. Co.,		* * * * *	1.00	
Central Maine Power Co., Rockland Cumberland County Power & Light Co.			1.00 3.07	0.22	Hamilton	0.20		0.09 5.00	
Massachusetts				0.14	Cleveland, Southwestern & Columbus	1.38			****
Berkshire St. Ry. Co., Pittsfield Boston Elevated Ry. Co., Boston	2.30		1.14 20.52	0.14	Ry. Co	• • • • •	****	6.99	• • • •
Brockton & Plymouth St. Ry. Co., Plymouth			1.00		Elec. Co., Columbus. The Columbus Ry., Pwr. & Lt. Co The Community Tract, Co., Toledo	4.64	6.35 4.83	6.97	
Conn. Valley St. Ry. Co., Greenfield Eastern Mass. St. Ry	0 42	1.93	18.59	0.50 12.75	The Community Tract. Co., Toledo Northern Ohio Traction & Light Co	0.09	1.26	4.53 1.97	2.34
Holyoke St. Ry. Co., Holyoke Massachusetts Northeastern St. Ry. Co.			1.10	0.96 4.22	People's Railway Co., Dayton. The Dayton & West, Tract Co., Dayton			0.50	0.75
Middlesex & Bost, St. Ry., Newtonville Milford & Uxbridge St, Ry. Co., Milford			5.30	4.00	The PennOhio Elec. Co., Youngstown Toledo, Bowling Green & Southern			3,63	
Nahana 6 Lana St. Da. Co. Lana			1.90	2.82	Traction Co., Findlay			2.00	
Springfield St. Ry. Co., Lynn Springfield St. Ry. Co., New Bedford Worcester Consol. St. Ry. Co., New Hampshire	0 26		0.26		Pennaylvania Allegheny Valley St. Ry. Co., New				
New Hampshire	U 26		2.52	1,30	Kensington. Altoona & Logan Valley Elec. Ry. Co			10.41	1.38
Berlin St. Ry. Co.			0.50	3 00	Beaver Valley Traction Co., New	0.09	*****	0.61	* + * •
Laconia St. Ry. Co. Manchester Trac., Lt. & Power Co			0.54	3.00	Buffalo & Lake Erie Trac. Co., Erie	3.30	0.03	1.06 0.63	0.87
Rhode Island				3 00	The Citizen's Traction Co., Oil City	0.07		0.10 1 88	
Newport Electric Corp. United Electric Rys. Co., Providence	0.72		9.46	3.00 1.90	Frankford, Tacony & Holmesburg St. Ry. Co, Philadelphia.			3.00	
Total	7 45	3.63	94.80	53.20	Harrisburg Rya. Co Indiana County St. Rys. Co., Indiana	0.25		0.98 0.62	1.21
North of the Ohlo and Ea	st of	the Mississ	lppl R	iver	Johnstown Trac. Co	0.03	0,53	1.14	
District of Columbia					Lehigh Traction Co., Harleton,			0.03	
The Capital Traction Co., Washington, Washington Ry. & Electric Co			3.37 4,25	3.08	Co., Mauch Chunk Montgomery Transit Co., Norristown			0.07	0.50
Washington-Virginia By. Co., Wash		* * * * *	0.11		Northern Cambria Ry, Co., Patton Northwest. Pennsylvania Ry, Co., Erie.			1.50	1.12
Hitnola Centralia & Central City Trac. Co			2.11	2.00	Northampton, Easton & Washington Traction Co., Easton				3,27
Chicago & Interurban Traction Co Chicago & Joliet Elec. Ry. Co., Joliet	0.38		0.58 2.76		Traction Co., Easton Philadelphia & Easton Transit Co., Doylestown				1.00
Chicago Surface Lines Chicago & W. Towns Ry. Co., Chicago			9.10 3.50		Philadelphia & Westchester Trac. Co.,		0.76		
E. St. Louis, Columbia & Waterloo Ry. East St. Louis & Suburban Ry		0,66	1.80		Upper Darby Pittsburgh Railways Co.	1.25		30 00	1.00
Elgin & Belvidere Elee, Co., Chicago Illinois Central Electric Ry, Co			0.38	4.00	Pottstown & Phoenlxville Ry. Co Rending Transit & Light Co			3 80	12.00
Indiana					Schuylkill Railway Co., Girardville Scranton Railway Co Stroudsburg Traction Co	0.30	0.04	0 84	0.27
Chicago, South Bend & Northern Indiana By. Co., South Bend			1,25	i	Westmoreland County R.H. Co.,		• • • •	0.17	
Gary Street Railway Co., Gary Indianapolis & Cincinnati Trac. Co.,	0.51		1.50		Pittsburgh			3 05	1.00 0.34
Indianapolis Indianapolis St. Ry. Co., Indianapolis .			0.33		Wilkes-Barre Ry. Co Valley Railways, Le Moyno		1,00		3.00 4.00
Latayette St. Hy., Inc., La rayette.	1.40		2,45 4,20		Wisconsin		*****		
So. Indiana Gas & Elec. Co., Evansville Union Tract. Co. of Indiana, Anderson.		0.14	0.95	0.57	Ashland Lt., Powr. & St. Ry, Co Beloit Traction Co			1 25 2,00	
Washington St. Ry Co., Washington		****	0.50)	Milwaukee Elee, Ry. & Lt. Co Wisconsin-Minnesota Lt. & Pwr. Co	5.10	0.21	13.10 0.07	
Maryland United Rys. & Elec. Co., Baltimore	1.59		12.00		Wisconsin Public Service Corp Wisconsin Rapids St. R.R. Co.	1.92		0.38	0.21
Michigan Benton Harbor-St. Joe Ry. & Lt. Co.,					Total.		21.52	242 52	72.09
Benton Harbor City of Detroit—Dept. of St. Rys	,		0.75 9.94		Lotai	, ,0.,,	21.72	242 32	72.07
Detroit United Rys		5 10			South of the Ohlo and Ea	ast of	the Missis	sippi Ri	ver
Grand Rapids Railway Co Menominee & Marinette Lt. & Trac	0 32		2.77		Florida Municipal Ry, of St. Petersburg,	1.02		0 75	
Co., Menominee	•		0 50		Pensaeola Elec. Cn	1.83			
New Jerney Bridgeton & Millville Traction Co.			3,00	n	Georgia Augusta-Aiken Ry, & Elec. Corp. o	r			
Bridgeton Jersey Central Tract. Co., Keyport			0.50		South Carolina			2 42 0.30	0 49
Millville Traction Co Trenton & Mercer County Traction			0 24		Columbus Elec. & Power Co			0.50 6 12	
Corp , Trenton	0 36		4,9		Rome Ry. & Lt. Co				0 25
New York Auburn & Syraeuse Elec RR, Co.,			0.1		Savannah Elee, & Power Co Kentucky	. 0 34			• • • •
Auburn Batayia Traction Co , Inc			0 2	5	The Cincinnati, Newport & Covingtor			0 43	
Binghamton Ry Co Black River Tract Co , Watertown			0 2. 0 1-	4	Ry Co., Covington.,			7 04	
The Brooklyn City R R Ca., Bklyn. Brooklyn Rapid Transit Co., N. Y. C.			12 0		North Carolina			2.00	
Buffalo & Lackawanna Tr. Co., Buffalo Empire State R R. Corp., Syracine			1 3	b .	Asheville Power & Light Co Durham Publie Service Co			2 00	* * * *
Fonda, Johnstown & Gloversville R R Interborough Rapid Transit Co., N. Y.	. 1 24		0 5		North Carolina Power & Lt. Co North Carolina Public Service Co	0.16		0.27	
International Railway Co New Paltz, Highland & Poughkeeper	0.16		7.8	3	South Carolina			1 17	
Traction C.				1.50	Charleston Consol. Ry, & Ltg. Co			1.17	* * * *
New York State Rys. (Rochester lines), Rochester	i 26		7 1	a contract of	Tennessee Cliattannoga By & Lt. Co		4	1 09	
New York State Rys., Syracuse New York State Rys. (Utica Lines)	0 01		2 0	в	Chattanooga Traction Co		2.00	2 62	
Ningara Junction Ry Co. Ogdensburg St. Ry Co., Odgensburg	0 23	3	0 0	9	The Memphis St. Ry. Co	. 1 28	***	1 69	
Poughkeepsie & Wactingers Falls Ry- Co , Poughkeepsie	0 2	,	0 2		Virginia Danville Traction & Power Co		/		0 14
Bichmond Light & R.R. Co., New Brighton, Staten Island			2 0		Newport News & Hampton Ry , Gas & Elec Co , Hampton	E		0 50	
Rochester, Lockport & Buffalo R R				1 22	Radford Water Power Co Virginia Ry & Power Co , Richmond		0 04	2 62 3 45	0 11
Corp , Rochester					- Hayman try to a contract try throughful	0			,

Railway	Exten City	sions, Miles Interurban		ilt, Miles Interurban
West Virginia			1 14	5 00
West Virginia Charleston Interurban R.R. Co Monongahela Pr. & Ry. Co., Fairmont. Dhio Valley Electric Ry. Co., Prinoeton Power Campany, Princeton, Tygarts Valley Traction Co., Grafton. Wheeling Traction Co.			1.14 1.46	5.00
Ohio Valley Electric Ry. Co.		0.96	2.50	1, 25
Tygart: Valley Traction Co., Grafton.			1.00	
Vheeling Traction Co			0.50	
Total	11.17	2.04	43.93	5.99
West of the Marizona Purson Rapid Transit Co		_	1.21	
Arkansas Che Pine Bluff Company Couthwest. Gas & Elee. Co., Texarkana			0.75	
allfornia				****
resno Traction Co			13.18 4.50	
Isrket St. Ry. Co Iunicipal Railway of San Francisco acific Electric Railway Co	1.69	10.22	11.04	4.31
acific Electric Railway Co etaluma & Santa Rosa R.R. Co., Petaluma		1.08		
Petaluma	0.50		6.57	• • • •
Co., Napa in Francisco-Oakland Terminal Rys in Francisco-Sacramento R.R. Co	0.54	*****	0.19 1.26	
in Francisco-Sacramento R.R. Co	0.36	0.98	0.03	9.00
outhero Pacific Coisalia Electric R.R. Co		0.49		9.66
olorado olorado Springs & Interurban Ry, Co.			4.00	
enver & Intermountain R.R	0.30	1.93	1.75	
olorado Springs & Interurban Ry. Co. enver & Intermountain R.R	0.50		5.50	
he Western Lt. & Pwr. Co., Boulder	• • • • •		2.28	
oise Street Car Co			1.00	
edar Rapids & Marion City Ry. Co he City Railway Co	1.07		1.00	
linton St. Ry. Coes Moines City Ry. Co	.0.30		2.50	
wa Ry. & Light Co., Cedar Rapids	0.70		2.00 1.00	
wa Ry. & Light Co., Cedar Rapids eokuk Elec. Co. iississippi Valley Elec. Co. ttuma Railway & Light Co.			1.00 0.78 0.85	
ttuma Railway & Light Co			0.64	
oux City Service Cori-City Railway Co., Davenport	0.33		0.64 1.51 6.38	
ansas he Hutchinson Interurban Ry. Co alina Street Railway Co	0.13		0.85	
ouls iana onroe Street Railwayew Orleans Public Service, Inc	2.87		0.69 5.70	
Innesota (ankato Elec. Trac. Co	3.48	0.76	0.57 6.75 1.37	
fissouri			2 00	
ape Girardea-Jackson Int. Ryanoibal Ry. & Elee. Co			2.00 0.38	
angibal Ry, & Elee, Cobe Kansas City Railwaya Cobe Missouri & Kansas Ry, Co	0.11		1.68	
oringheld Traction Co			0.75	
. Joseph Ry., Lt., Heat & Pwr. Co nited Railways Co. of St. Louia	2.66	0.08	2,92 19.16	0.70
Iontana reat Falls St. Ry			0.25	
ebraska maha & Council Bluffs St. Ry. Co., Omaha			9.96	
klahoma ortheast Oklahoma R.R. Co., Miami,		13.53		
klahoma Ry. Co.	0.00	0.12	1.80	
ortheast Oklahoma R.R. Co., Miami. klahoma Ry. Co ttsburg County Ry. Ca., McAlester ulsa St. Ry. Co.	0.09	0.15	0.75	
regon aeific Power & Light Co., Astoria			0.36	
exas allas Railway Co	1.53	28.05	0.27	
astern Texas Elec, Co., Besumont I Paso Electric Rsilway Co	0.42		0.27	
ouston Electric Co	5.30		4,60	
allas Railway Co sstern Texas Elec. Co., Beaumont I Paso Electric Railway Co ouston Electric Co orthero Texas Tract. Co., Fort Worth m Antonio Public Service Co ichita Falls Traction Co	1.50		1.20 2.34	
ashinatan				
rays Harbor Ry. & Lt. Co., Aberdeen			0.01 1.50	
eattle Municipal St. Ry	6.93		3.04	
ookane United Rys	3.13	0.62 0.05	0.97	
rays Harbor Ry. & Lt. Co., Aberdeen. ewiston-Clarkston Tr. Co., Clarkston. aattle Municipal St. Ry. ookane United Rys. 'alla Walla Valley Ry. Co. akima Valley Transportation Co		0.05		
Total	39.23	57.92	145.89	23.67
Outsido the liberta				
ethbridge Municipal Ry ritish Columbia, Canada ritish Columbia Elec. Ry. Co., Ltd.,			2.00	
ritish Columbia Elec. Ry. Co., Ltd., Victoria	2.21		0.20 0.50	
fanltoba, Canada Vinnipeg Electric Railway Co	1.36		0.88	

Railway	Exten	nsions, Mile Interurban	Reby City	ilt, Miles Interurba n
New Brunswick, Canada New Brunswick Pr. Co., St. John, N. B.			0.47	
Nova Scotia, Canada Nova Scotia Tramwaya & Power Co., Ltd., Halifax	,,,,,		2.00	
Ontario, Canada The Cornwall St. Ry., Lt. & Pwr. Co Dominion Power Transmission Co.,			1.00	
Ltd., Hamilton Kingston, Portsmouth & Cataragui			1.55	
Elec. Ry. Co., Kingston. Kitebener & Municipal St. Ry. Co. The London Street Railway Co. Niagara, St. Catharines & Toronto Ry.	2.00		0.50 0.25 1.20	* * * * *
Co Toronto Transportation Commission	27.72		0.75 34.69	****
Quebec, Canada Hull Electric Company. Montreal Tramways Company. Quebec Railway, Light & Power Co. Sherbrooke Ry. & Pwr. Co.	3.23 1.08 0.11		0.17 10.76 0.69	****
Saskatchewan, Canada Regina Municipal Railway Saskatoon Municipal Railway	0.10 0.28			
Total	38.09		57.61	••••

almost nothing during the last three years, but which gives every indication of becoming greater than ever in the next few years. In the table the mileage for track extensions has been separated between urban and interurban service since 1916. Previous to that date information for such a segregation was not available.

The large general table gives the single-track mileage for extensions and reconstruction by individual

ELECTRIFIED STEAM LINES	
	Extensions,. Milea
British Columbia Electric Railway	8.15
Denver and Intermountain R.R	3 30
Lake Erie and Northern Railway (Ontario)	0.25
New York Central R.R.	0.06
New York, New Haven and Hartford R.R	0.49
New York, New Haven and Hartford R.R. Southern Pacific Co	0.10
Total	12.35

companies. Following our usual practice the various railways are alphabetically grouped by states, and the states are divided into five geographical districts to correspond with other similar tables in this issue. The group west of the Mississippi River has made more extensions of new track, but the group north of the Ohio and east of the Mississippi River has done more work in reconstructing old track. The information for this table was prepared from replies to a questionnaire sent to all railways in the United States and Canada. Approximately 750 companies replied. New York State has the largest mileage for track rebuilt with twentytwo companies reporting a total of 72.12 miles reconstructed. Sixteen companies in Canada report 57.61 miles of track reconstructed.

Indicator Shows Location of Car

AN INGENIOUS "road guide" is being tried out on the Metropolitan Electric Tramways, Ltd., London, to indicate to passengers just where they are at any particular time. As described in the Electric Railway and Tramway Journal, this indicator is a box arrangement, some 36 x 14 in., containing a film or chart of the road being traveled. Midway along the glass dial is a pointer, which indicates to the passenger the exact position of the tram at all times. As the tram moves along the chart unwinds itself from one spool to another, and on this moving chart are printed all the features of the journey, such as streets, compulsory stops, museums, places of business, etc.; in fact, it keeps the passenger well informed at all stages of the journey.

Association News & Discussions

Recent Air-Brake Developments

At Its December Meeting the New England Street Railway Club Devoted One Session to Discussion of Air-Brake Development, with Particular Reference to Recent Improvements in Traction Equipment

A COMPREHENSIVE paper, covering the whole field of air-brake development, in both the steam and electric railway fields, was presented at the December meeting of the New England Street Railway Club, held at the Engineers' Club and the Copley-Plaza Hotel on Dec. 14. The speaker was Joseph C. McCune of the New York office of the Westinghouse Air Brake Company. In opening his paper he said that many of those closely associated with the airbrake art feel that the subject of brakes is not given the consideration in the transportation industry that really belongs to it.

Mr. McCune pointed out that the air brake may be considered, first, as a safety device and, second, as a utility device. The importance of provision for stopping a car is so great that the ability of the air brake to bring this about has rather obscured its utility characteristics. By this he meant the effect on schedule speed, resulting from ability to stop a car quickly. Mr. Mc-Cune then gave a detailed statement of the history of the air brake, leading up to the variable-load brake. This was applied first on cars designed in 1914 for the subway service of the New York Munlcipal Railway, under the general supervision of W. G. Gove, superintendent of equipment.

This variable-load brake has as its basic element an automatic brake. The deflection of the truck springs corresponding to the passenger load on the cars is utilized to cause movements of various parts of the air-brake system so as to adjust the braking effort to the load on the cars. The reservoir volume by this means is changed as the load on the car changes. As a result the cylinder pressure secured from a given pressure reduction is made to correspond to the load on the car. In addition, limiting valves are used which limit the cylinder pressure obtainable to the proper value for whatever load the car may be carrying, and give a finer adjustment than is accured from the variable reservoir volume alone.

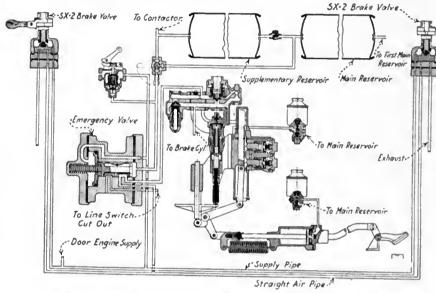
The newest development is an attachment to the braking equipment of surface cars, which may be added to straight air or semi-automatic brake equipment, so as to enable the loaded car to be braked to a greater degree than has hitherto been possible. The need for such an attachment originated in the recent development of lightwelght city cars with a high passenger-earrying capacity.

In the late fall of 1921, sald Mr.

McCune, John Lindall of the Boston Elevated Railway was making studies of designs of surface and subway cars, both involving cars of low weight empty, but with high passenger-carrying capacity. From these studies it became evident that if the usual brake equipment were applied to these cars their full traffic capacity could not be

an emergency application, therefore, it has been the practice to limit the maximum braking effort upon the empty weight of the car. This was all right with cars having a relatively low ratio of live to dead load. Where the ratio is high, however, the case is different.

Mr. McCune next described in detail the operation of the variable-load attachment, which was covered in an article in the issue of this paper for Sept. 16, page 934. This article dealt with the new light-weight one-man cars for the Eastern Massachusetts Street Railway, which were the first to



Sectional Diagram of Air-Brake Equipment With Variable Load

utilized. Thus the variable-load attachment was developed,

The speaker said that the difficulty heretofore encountered has been that the air brake developed a certain retarding force which was based on an empty car weight, and was a constant force regardless of whether the car was empty or loaded. With straight airbrake equipment it might be possible to use a high reservoir pressure and depend upon the motorman to use in his brake cylinder only enough pressure properly to control the car. In actual service, however, it was not considered advisable to provide too high a pressure, because the motorman could not slways be depended upon to use exactly the pressure needed for a particular load and therefore there would be a tendency to flatten the car wheels.

With semi-automatic equipment, or in any equipment when an emergency valve is provided, the control of the cylinder pressure obtainable in emergency valve is provided, the control of the cylinder pressure obtainable in emergency is taken away from the motorman. To prevent wheel sliding in

which the new device has been applied. In summing up this part of his paper, Mr. McCune pointed out that with this device the braking effort is adjusted to the weight of the car by a mechanism which in effect weighs the live load. Advantage is taken of the fact that as the load on the car increases the hody bolster approaches the truck transom through the compression of the truck springs.

Some of the advantages secured from the variable-load attachment were stated by Mr. McCune to be as follows: First, with respect to safety, its use makes it possible to stop a loaded car in a shorter distance than has heretofore been possible. Quicker stops are obtainable, not only when an emergency application is made, but also in service applications.

To illustrate the benefits to be obtained from quicker stops, he assumed the case of a car weighing empty 32,000 lb., in one case equipped with the usual brake apparatus and in the other with the variable-load apparatus added. Assume in each case a braking ratio of 100 per cent and a live load of

100 passengers, or 14,000 lb. loaded car without the attachment can be stopped from 20 m.p.h. in 9.6 seconds, while with the attachment it can be stopped in 7.4 seconds. With sixty stops per single trip the saving would be 132 seconds, or 4.4 minutes for a round trip. If the cars on an assumed line had a four-minute headway this would mean a saving of one car. It is true that the saving of 2.2 seconds could not be secured on every stop; moreover, it is possible only with a high ratio of live to dead load. The example, however, indicates the potentiality of the variable-load attachment for saving.

Other advantages of this device mentioned by Mr. McCune were: The cutting down of running time in order to increase schedule speed; the more uniform braking secured, and the ease of changing the adjustment of the limiting valve so as to vary the braking

ratio on the car.

In conclusion the speaker mentioned also, as very recent developments in air brake equipment, the apparatus designed for gas rail cars as used in steam railroad service, and the automotive brake equipment as applied to trolley buses, auto buses, trucks, etc. These are special applications straight air or semi-automatic equipment.

Central Association to Meet in Louisville on Jan. 18 and 19

HE program for the C. E. R. A. has been announced by Secretary L. E. Earlywine as below. The meeting will be held at the Seelbach Hotel, in Louisville, Ky., on Thursday and Friday, Jan. 18 and 19. The Interstate Public Service Company has arranged to furnish a special car to be operated between Indianapolis, Ind., and Louisville on Jan. 17, leaving at 3 p.m. and arriving at 6:45 p.m. The car will return on Friday at a time to suit the convenience of the passengers.

> THE PROGRAM THURSDAY, JAN. 18, 9 A.M. Meeting of Executive Committee

Morning Session, 10 a.m.

Report of Secretary and Treasurer and Appointment of Convention Committees, Presidential address by S. W. GREENLAND, general manager Indiana Service Corpora-

general manager Indiana Service Corporation.

Address on "The One-Man Car and Economic Need" by C. E. Moagan, general
manager Brooklyn Rapid Transit Company.
Discussion led by Mr. Greenland, E. M.
Walker, and G. T. Seely.

Address on "Publicity" by Arthur
Kock, managing editor Courier-JournalLouisville Times.
Discussion led by E. R. Kelsay and
W. H. Sawyer.

Afternoon Session, 2 p.m.

Meeting of the Engineering Council, Harry Reld, president, Interstate Public Service Company, Chairman. Report of the chairman.

cnairman.
Paper on "Emergency Stops" by H. C.
DECAMP, assistant general manager, The DECAMP, assistant general manager, City Railway, Dayton, Ohio.

General Discussion

Paper on "Operation of High-Speed, Light-Weight Interurban Cars" by E. B. GUNN, superintendent of transportation & equipment Western Ohio Railway.

General Discussion

Papers on "Full and Semi-automatic Versus Manually Operated Substations for

Electric Railways." by C. A. Butcher, general engineering department Westinghouse Electric & Manufacturing Company, and C. M. Davis, railway engineering department General Electric Company.

General Discussion

Address on "Co-operation between Sectional Associations and the American Electric Railway Association by W. H. SAWYER president East St. Louis Railway.

Annual dinner for members, Safety Hall, Louisville Railway, 6:30 p.m. Dinner for ladies, Pendennis Club.

FRIDAY, JAN. 19, 9 a.m.

Paper on "Use of the Interurban Bus" by G. T. Seely general manager Pennsylvania-Ohio Electric Company.
Paper on "City-Bus Operation," by A. C. BLINN, vice-president and general manager, Northern Ohio Traction & Light Company.

General Discussion

Paper on "The Safety Chairman, His Duties, His Authority, His Responsibilities," by N. W. Funk, safety chairman, Louisville Railway. General Discussion

Address on "Modern Regulatory Franchises," by Chuachill Humphrey, assistant general counsel, Louisville Railway.

General Discussion

Address on "Marketing Your Own Commodities," by R. H. WYATT, general superintendent, Louisville & Interurban Railroad Company.

General Discussion

Unfinished business, report of committees, and election and installation of officers.

New Name for Southwestern Association

FFECTIVE Jan. 1, 1923, the name Effective same i, 1929, sure known for the association previously known as the Southwestern Electrical & Gas Association is changed to Southwestern Public Service Association. The office remains Slaughter Building, Dallas, Tex. The 1923 convention will be held in Fort Worth, May 15 to 17.



Banquet in Washington

PPLICATION blanks will be sent A out from association headquarters next week to be filled out by those who wish to attend the banquet to be held on Feb. 16 at the New Willard Hotel, Washington.

The committee in charge of the program for the midyear meeting on Feb. 16 is completing arrangements for the program but is not yet prepared to make a definite announcement as to who will present addresses. It will be remembered that the general topic to be considered in the morning session is that of public utility regulation and in the afternoon session that of taxation of public utilities.

Educational Committee Announces Plan

THE American Association commit-I tee on education has addressed a letter to member companies outlining the first step in the year's activities. The committee first points out that there are three fundamentals in the educational problem, as follows:

1. Vocational training of employees. 2. Education of employees for re-

sponsibilities of advancement in railway work.

3. Co-operation with educational institutions to assure a supply of capable recruits for the industry.

It then asks for the appointment of an official on each property to organize the educational work along these lines and act as a connecting link hereafter between the company and committee.

American Publicity Committee Meets

THE joint meeting of the publicity THE joint meeting of the passing committee of the American Electric Railway Association and the subcommittee on information of the Committee of One Hundred was held in New York Jan. 3. Those in attendance were C. D. Emmons, F. R. Coates, B. C. Cobb, Barron Collier, P. H. Gadsden, Henry R. Hayes, J. W. Welsh and Labert St. Clair. The purpose of the meeting was to review the work of the publicity department of the advertising section of the association and to lay out plans for the future. Recommendations will be prepared by the two committees in regard to future work, and they will be presented to the Committee of One Hundred.

Special Reports Available

American Association an-I nounces the preparation of the following special reports which are available to members in good standing:

Public Utility Laws: A summary of the laws creating the state public utility commissions, giving an analytical digest of the main provisions covering their jurisdiction and powers over transportation companies. This is the eighth and last installment of this compilation, which was begun last June.

Wages of Employees Other Than Trainmen: Gives wages paid shop, barn, overhead line, way and power house employees by more than 150 elec-

tric railway companies.

One-Man Car Operation: Summary of the replies to the Association's questionnaire on the subject, showing the number and types of one-man cars operated, fare collection methods, accident record and attitude of public toward operation with one man.

State Motor Vehicle Laws: A tabulated statement prepared by the Motor Vehicle Conference Committee showing annual state taxes and fees on motor vehicle operation and size and weight restrictions in state motor vehicle laws.

Electric Railways Operating Motor Buses: A list of fifty-eight companies operating bus routes, showing length of route, number of vehicles, type of vehicle, fare charged, method of collection, transfer arrangements, etc.

Supplement to Weekly Pass Compilation: Gives data on three additional companies received too late for inclusion

in Nov. 1 compilation.

In addition to the above, supplements to the "Wage Bulletin," the "Fare Bulletin" and "Cost of Living Studies" have been prepared, bringing them down to date.

The News of the Industry

Outline Construction Activities of 1922—Surveys Outlook for 1923

Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne, Ind., has issued a statement reviewing the construction and service activities of the past year, and giving a few views on the outlook for the coming year. He says that \$800,000 was spent on construction work and of this all but \$125,000 was spent in Fort Wayne. Excerpts from his statement follows:

Excerpts from his statement follows:

The new substation for city railway and light and power purposes at Webster and Melita streets afforded the greatest individual improvement in service to our patrons. This station, which cost \$150,000, enabled the company to raise the voltage on all city railway lines so that the improved power conditions could be had at the ends of all the city lines. This has assisted materially in maintaining the new and faster schedules with an increased number of cars on the lines. This substation has also permitted the company to hook up the underground power lines which serve the downtown merchants from the south side. This substation-expenditure is just a sample of the construction costs which must be met by a utility company purely in the interest of better service.

Fifteen new cars of the improved type, with air controlled doors and up-to-date devices, were ordered last spring for November delivery. The first is ix of these cars arrived six weeks late and were recently put in service. The remaining nine cars are en route between St. Louis and Fort Wayne and will be put into service within the first week of the new year. The cost of these fifteen cars was \$120,000. The increased riding this winter will require the use of the new cars and every other available car for city service.

Power station changes comprised the installation of a new 6,000 kw, 60-cycle generator. The company is in the midst of changing all the interurban substations over to 60-cycle plants so that all of the small towns which are served with light and power can have advantage of the modern 60-cycle quipment instead of the 25-cycle service which was in vogue when these interurban lines were huilt.

Of the pass Mr. Feustel said: The new substation for city rallway and that and power purposes at Webster and

Of the pass Mr. Feustel said:

One of the service items which did not One of the service items which did not require construction money but which proved to be of great value to our patrons was the installation of the dollar weekly pass. This was put in the last of February for a six months trial and has proven so popular that it will probably he continued indefinitely. It is of interest to the Fort Wayne was the second city in the country to adopt this pass, more than twenty clies now have a weekly pass which is heing sold for \$1 to \$1.50 depending on local conditions.

He outlined the needs and requirements for the year 1923 saying that the demands for additional facilities were staggering. The growth of the city in-cluding its industrial developments was responsible for these needs. In conclusion he said the only problem would be how to get the construction

Votes Down Service at Cost and Municipal Ownership

Both the service-at-cost contract and the purchase by the City of Ottawn of the Ottawa (Ont.) Electric Railway were defeated by the public on Jan. 1. During the past year the railway company has been negotiating with the City of Ottawa for an extension of its franchise.

The questions on which the people voted were whether the city should sign an agreement for a new franchise allowing a flexible rate of fare and a guaranteed return of 7½ per cent to the company on \$4,500,000 and on \$500,000 to the city, which was the city's equity in the road, or whether the city should buy out the Ottawa property and assets for \$4,500,000 and have it operated by an independent commission. As a result of the vote no additions to the plant or equipment are contemplated in 1923. The questions at issue were dealt with previously in the ELECTRIC RAILWAY JOURNAL.

Hydro Radials Voted Down

By a majority of 5,245 votes Toronto. Can., rejected on Jan. 1 the agreement to give a free six-track right of way on the city's waterfront for provincial Hydro-commission radials. However, a proradial board of control was elected by a small vote.

Mayor Maguire, the champion of the agreement, was elected mayor for 1923. over R. J. Fleming, who led the antiwaterfront forces, by a majority of 840 in a total poll of over 80,000, the largest ever recorded in Toronto. The 1922 board of control, were all re-elected with the exception of Controller Russell Nesbitt. An unusually large number of new men were swept into aldermanic seats on the crest of the antiradial agreement wave in the business wards.

The old council endorsed the agreement in September last by 18 to 10, with one alderman absent through illness, while the new council stands 16 to 13 for the agreement. There will probably be no advocacy for the present agreement however, since the ratepayers have disposed of it, though the vote does not preclude the council from entering into new negotiations.

The electors also seemed to think that Fleming, who was manager of the Toronto Street Railway up to the time of its transfer to the city sixteen months age, and is said to be a stockholder, might, if elected mayor, be in a position to influence the city's action on the award for the car system which will come before the 1923 Council.

During the campaign the antis emphasized that they were not opposing radials, but only the agreement between the city and the commission, which, it was contended, gave too much. The right to collect fares within the city and thus compete with the city's own system and the underground franchise to the heart of the business district particularly were regarded as objectionable

In Hamilton, Ont., the hydro radials were also defeated. The result was not unexpected. Guy Long was elected hydro-commissioner and the hydro radials by-law was rejected by 1,200.

Subscribed Fund to Be Returned

Arrangements for the return of a fund of \$25,000 subscribed by persons living along the line of the abandoned Springfield, Troy & Piqua Railway, to the subscribers has been made by Judge John E. Sater of federal district court. The fund was subscribed some months ago when promoters sought to organize a new company to take over and operate the traction line. The project failed, however, and the property was sold to the Schonthal Company of Columbus which has taken steps to junk it with the exception of a strip between Springfield and Maitland which may be taken over by a local company to be used for switching and transfer purposes.

The court ordered the payment of taxes due Clark, Champaign and Miami Counties by the traction company, to be made out of the sale price. The penalty, however, was eliminated by the court. The taxes ordered paid amounted to \$10,029 plus a penalty of \$700, covering a period of four years, and are against personal and real property of

the company.

The transmission lines of the company have been sold to the Springfield Light, Heat & Power Company, and will be left standing. They will be used to supply electricity to towns along the route by the Springfield company.

Railway's Value Again Being Disputed

G. F. Fisher, Mayor of St. John, N. B., has notified the Investment Bankers' Association of America through Henry R. Hayes, chairman of the committee on public service securities of that association, that he does not wish to discuss further the matter of arbitrating the dispute between the city of St. John and the New Brunswick Power Company, He has instructed Mr. Hayes that he wishes the latter to direct all communications to the City Council and not to himself, as Mayor of St. John. In reply Mr. Hayes has advised that he would rather communicate with the Mayor and not the City Council.

Mayor Fisher has stated that the city will not offer more than \$2,577,665 for the company's property. According to him, at least \$1,000,000 would be needed to put the railway into first-class condition. Representatives of the company say that the railway property is now

in good shape.

Mr. Fisher reiterates his refusal to submit the dispute over the price to arbitration. He states the city has made its offer and the offer has been refused by the company. The Investment Bankers' Association of America is making an effort to reopen the negotiations and on Jan. 10 a delegation of the association will be heard by the City Council of St. John.

New Governor for Home Rule

New York Executive Declares for City Instead of State Control of Purely Local Utilities and for Municipal Ownership—Cities Should Be Free to Adopt Any Form of Transit

OVERNOR SMITH of New York Gin his inaugural message delivered to the Legislature on Jan. 3 made recommendations for "home rule" of utilities and sweeping changes in the public service commission law along the lines which have been predicted and have already received much publicity. He also made reference to the water powers of the state, postponing his direct advice on this matter till later in the legislative session.

The Governor said that probably no political principle has received so much statewide discussion as the question of a greater grant of power by the State to municipalities over such things as are wholly local. In his opinion the cities of the State today, and particularly New York City, find themselves restricted by what is really a charter of limitation. The phenomenal growth of the cities brings up constantly for settlement new problems that in his opinion the city should be left free to determine without interference by the State. He said in part:

the State. He said in part:

The Legislature of 1921 passed an amendment to the Constitution to bring this about which is now pending before your honorable body for passage the second time. If, in your judgment, this amendment accomplishes the purpose it should promptly pass. If objections raised against it are of a minor nature it might be well to pass it any way and then start the legislative machinery again looking to further amendment that will cure any defect to which any real objection has been made. I make this suggestion having in mind the delay of the whole proposal that would occur through an entirely new initiation. Whatever action is taken on the present amendment at this session, I suggest for your consideration the initiation of a new amendment that would give to the communities of the State that full degree of local self-government which they are demanding and to which they are justly entitled. As this is a matter exclusively for the Legislature and the people themselves, I leave that matter for determination by your honorable body.

Illustrative of this whole principle has been our treatment of the subject of control of public utilities.

About thirty years ago, the State, through a commission named by an act of the

About thirty years ago, the State, through a commission named by an act of the Legislature, provided for the construction of subway railroads in the city of New York.

York, In 1907 that commission was abolished by the enactment of the public service com-missions law and its duties transferred to the Public Service Commission. The new commission exercised supervision over con-

the Public Service Commission. The new commission exercised supervision over construction and also regulatory powers as to character of service and certain supervision over the issuance of bonds or certificates of indebtedness of any kind.

In 1919 the Public Service Commission for what was known as the First District, which was New York City, was radically changed by separating regulatory powers from supervision of construction and provision was made for a single commissioner with regulatory powers and a single commissioner to supervise construction.

In 1921 the two single-headed commissions for New York were abolished and there was created in their place a single commission, composed of three commissioners. This commission, known as the Transit Commission, was given power to propose routes and supervise new construction. In addition, it was given certain powers of regulation among which was the right to fix the fare, although the fixation of the farehad, prior to that time, been a matter of contract between the city of New York and the operating companies. Power was also lodged in the State to cancel contracts

between municipalities and public util'ty corporations. This enabled the Transit Commission to nullify contracts under which

Commission to nullify contracts under which the city by investment of its own funds had secured the agreement of the railroad company to a 5-cent fare. I need hardly tell you of the violent storm of opposition that came practically from a united press and from the great majority of the people when the State divested the municipality of power over her own contracts.

Rapid transit construction is purely a municipal enterprise and a municipal enterprise and a municipality is not assisted by the State in its conduct of this activity in the slightest degree. In every other municipal activity the city of New York has always enjoyed a free hand to work out the will of her citizens through her own elected officials, as for example when the Legislature empowered the city of New York to bond itself for \$150,000,000 in order to provide an adequate water of New York to bond itself for \$150,000,000 in order to provide an adequate water supply. The State granted an extraordinary power to the municipality in giving it the right to go outside of the city's corporate limits and condemn property for the purposes of a water supply.

Naturally the people are unable to understand upon what theory the State undertakes to supervise the construction of its subways. They are wholly within the limits of the city and they do or will in time belong to the city and cannot be considered as anything other than a purely municipal enterprise.

The Public Service Commission of the

long to the city and cannot be considered as anything other than a purely municipal enterprise.

The Public Service Commission of the State exercises regulatory powers over all public service corporations, except railroads within the city of New York. In the fifteen years that have passed since the organization of the two public service commissions, we have had fifty-four commissioners and the Public Service Commission has not yet succeeded in being much more than an object of political patronage. I think that I am within the truth when I say that the theory in itself never commanded a great amount of public respect. It makes l'ttle difference upon what you predicate it. The people in cities are unable to understand why the State interferred with the things that they believe to be local to themselves. In the last reorganization of the State Public Service Commission in 1921 the people of the State found that the control that they exercise over their own public utilities through their franchise agreements was taken away from them and vital portions of the contracts were nullified and the powers formerly exercised by the cities were transferred to the Public Service Commission. No defense can be made of this as it constitutes an absolute denial of self-government and home rule in the matter of contracts in all the cities of the State for police power. There is no reason why the State should not select a municipality as its agent. To my mind we would get a better result.

In a democracy the people want the kind of government that suits the majority and not the kind that squares with some principle that has in all probability outgrown its usefulness.

In this connection the Governor said that the people are thinking more about their public affairs than they did some years ago and the State can make no mistake by selecting the elected officials of the cities to determine questions that have to do with the welfare of the municipality, such as proper regulation of its public utilities. then continued:

The people of the State, in the fundamental law have granted to cities throughout the State exclusive power to pass upon any proposal to lay down railroad tracks. Where this power rests all other power should rest with it to the end that there may be no division of responsibility. It is obvious, therefore, that no State commission can take any action looking to the construction of additions to our subway system or railroads in other cities without the consent of the cities. No proposal by a State commission can result in actual

construction unless that proposal receives the approval of the city. This divided power has resulted in complete deadlock, which can be broken only by placing the statutory powers in the municipalities which already has the constitutional powers necessary for authorizing construction. You cannot give the constitutional powers inherent in the city to a State commission and, therefore, in my judgment, it is necessary to give the city the statutory powers also. Not only do I believe that all jurisdiction over the construction of rapid transit railroads should be given to the local authorities, but I also believe that they should have delegated to them the State's police power of control over all public service corporations operating within their corporate limits.

corporations operating within their corporate limits.

There are certain public utilities that are not within the confines of a single city, as their operations are either between cities or state-wide. As to these utilities the State must retain its powers of control and regulation

must retain its powers of control and regulation.

It may also be that some of the cities of the State may be unwilling to assume the obligations of regulation. We must not force it upon them, as that would again constitute an interference with home rule. We might, in such cases, say that should a city by resolution of its Common Council and, in the case of the City of New York, by its Board of Estimate and Apportionment, or after referendum to its people, petition the State to perform its regulatory service for it, the State should do it through its Public Service Commission. If a city decides to carry out its own regulation, it should be left free to bring into existence by local ordinance the board, commission, bureau or agency to perform this service.

In order to carry out this policy it is the opinion of the Governor that the present Public Service Commission should be abolished and power given to him to appoint not more than three commissioners to regulate such utilities as will not be regulated by the cities, either because they operate outside the corporate limits of a city or because the city may, by proper resolution, request the State to do it. In this connection he recommended:

- 1. That in the preparation of the legislation to abolish the present Public Service Commission the power heretofore held by cities over the terms of their franchises be returned to them, where it belongs.
- 2. That the Transit Commission in the City of New York be abolished and all its power with regard to the laying out of routes and supervision of construction be transferred to the Board of Estimate and Apportionment, to be exercised by this body through any agency which it may select. Its regulatory powers should be restored to the Public Service Commission Act which will contain the provision that a city may be the agent of the State for carrying out these powers unless it should, by proper resolution, request the State to relieve it of the duty.

In conclusion the Governor said:

Directly in line with this program is the municipal ownership of public utilities. Public utilities have become so essential to the life of our great cities that the cities themselves should be permitted to purchase, build, own or operate them when a municipality determines this to be in its best interest.

interest.

As far as transit is concerned the cities should be free to adopt any form of conveyance found suitable to their needs, whether it be railroads or omnibuses. This is not the introduction of any new and untried principle in government. New York City now owns railroads and owns and operates ferry boats. I am simply asking for an extension of the principle to all the utilities and for all other cities.

To the people themselves, as distinct from their organized communities, certain political rights and privileges of which they have been deprived, should be restored.

\$24,000,000 Construction Program

Roads in London Plan to Expend This Amount in Addition to Similar Sum Now Being Spent-Important Plans Under Way for Linking Up Lines

THE London underground electric Watford to Sutton, a distance of 30 miles. In any event, train services will scheme of developments, which if carried out are estimated to cost more than £6,000,000. This is in addition to the new works now under construction, which will cost a similar amount. The notices which were given in the latter part of November show that in the 1923 session of Parliament the London Electric Railway and the City & South London Railway intend to promote bills to authorize them to carry out the new scheme. This means the development of a policy which has already been partially carried out, namely, the extension of the "tube" railways through the outer suburbs, the connecting of them with surface lines in the country round, and the interconnecting of the "tubes" themselves so that through trains may be run from one to another.

TUNNELS BEING WIDENED

The tunnels of the City & South London Railway are at present being widened to approximately the same diameter as those of the other railways. At the same time a junction line is being formed near Euston to connect this line with the Charing Cross & Hampstead Railway. Further, a 42mile surface extension from Hampstead to Edgeware is now being built. This wi'l enable trains to be run from Edgeware in Middlesex through the City of London to Clapham, a southern suburb -a total distance of about 12 miles. The new proposal is to extend the City & South London Railway for 6 miles southwest to Norden in Surrey, where a junction will be formed with the authorized Wimbledon & Sutton Electric Railway. When the latter is built it will be possible to run through trains from Edgeware in the country north of London to Sutton in the country to the south of it, a distance of about 22 miles.

The other proposed extensions are shorter, but they are important connecting links. In order to provide for the City & South London Railway a connection with the fashionable West End it is proposed to continue the Charing Cross & Hampstead Railway south from Charing Cross to a junction with the City & South London Railway at Kennington, south of the Thames, a distance of about 2 miles. Junctions will be constructed near Waterloo Station (on the south side of the Thames), by means of which Baker Street & Waterloo Railway trains also can be run to Kennington and thence on to the City & South London line. As at present through trains are run from Watford In Hertford-hire over the electric lines of the London & North Western Rallway on to the Baker Street & Waterloo Railway at Willesden and thence by that line to Waterloo, it will be possible, if desired, to have through trains from

miles. In any event, train services will be provided between Sutton in Surrey and both the City and the West End.

The anticipated large increase of traffic will require station developments in the central area, and accordingly it is proposed to build a new station at Piceadilly Circus under the roadway with staircases giving access to all points in the Circus. Escalators will connect direct to the station platforms on the Baker Street & Waterloo Railway and the Great Northern & Piccadilly Railway, which cross one another (at different levels) at this point. At Leicester Square Station (where the Hampstead Railway crosses the Piccadilly Railway) additional lifts will be

At Waterloo Station elaborate interchange facilities will be provided between the Baker Street & Waterloo and the Hampstead lines, while escalators will enable passengers rapidly to reach the street and the Waterloo terminal station of the London & South Western Railway, which at this particular location is an elevated line.

From a railway construction point of view, one of the most important of the London underground development schemes is the linking up of the City & South London Railway with the Hampstead line between Burton and Camden Town. This junction must provide for the City & South London Railway trains and the trains of both Golder's Green and Highgate branches on the Hampstead Railway. On a flat junction it would be impossible to accommodate the trains of all three lines without serious delay occurring, but an ingenious system has been planned by which the tracks of one line will be earried over or under the tracks of another with the result that just south of Camden Town, where the lines converge, there will be six separate "tubes" within a very short distance of each other.

\$500,000 in Improvements

Extensive improvements and betternients in the properties of the El Paso (Tex.) Electric Railway will be started at once, according to Alba H. Warren, general manager, and J. Frank McLaughlin, superintendent. These two officials have just returned from Houston, where they conferred with Luke C. Bradley, district representa-tive of Stone & Webster, and secured Mr. Bradley's approval to the program of improvements to be made in the El Paso lines. Several extensions will be built, new cars purchased, an addition made to the power plant, and the lines in El Paso put in first-class condition. More than \$500,000 will be spent by the railway company in making the improvements.

Another Development on Ruling on Passenger Terminal

The California State Railroad Commission has announced that it will attempt to obtain a rehearing before the California State Supreme Court, whereby the court annulled the commission's order directing the steam road and electric interurban lines entering Los Angeles to provide a joint passenger terminal.

If the Supreme Court's ruling is upheld, the commission declares it would initiate proceedings before the Interstate Commerce Commission with a view to bringing about the co-operative erection of the terminal. The Supreme Court's decision in effect conceded the commission's power to order elimination of grade crossings, but held that the commission did not have jurisdiction in cases involving terminal facil-

With the proposed union terminal project annulled by the State Supreme Court, the only feasible and comprehensive plan for a joint station and for elimination of traffic congestion in Los Angeles is the immediate adoption of the elevated railway and joint passenger scheme of the Union Pacific, Southern Pacific and Pacific Electric Railways. This was the statement of Frank Karr, vice-president and chief counsel of the Pacific Electric Railway, who announced that every effort will be made by the railway interests to have the project immediately approved by the State Railroad Commission. This plan, which was first announced in 1917. provides for an expenditure of more than \$10,000,000 by the three railway concerns in the following manner:

concerns in the Ioliowing mannet.

The Pacific Electric Railway to provide elevated railways to connect its Main Street passenger terminal with Fourteenth and Alameda Streets, passenger station of the Southern Pacific Lines at Fourth Street and Contral Avenue, Los Angeles River and

Central Avenue, Los Angeles River and Central Avenue, Los Angeles River and Ninth Street and Maey Street. A joint station to accommodate both the Union Pacific and Southern Pacific lines will be erected on a downtown location.

Officials of the Pacific Electric Railway declare that if the scheme is adopted all through passenger and freight trains, as well as light engine movements, on Alameda Street will be

The plan will also make possible the elimination of all grade crossings along the Los Angeles River and provide adequate terminal station for the Union Pacific and Southern Pacific, with convenient transfer at auch stations to and from the Pacific Electric interurban trains.

The joint plan, if earried out, will give immediate relief to interurban and suburban traffic of the Pacific Electric lines reaching all the territory to the north and east via Aliso Street and to the south along Long Beach Avenue.

If the project is approved by the State Railroad Commission the sanction of the Interstate Commerce Commission will then be obtained and the next step will be the filing of an application with the city of Los Angeles for a franchise to construct the elevated system over public streets.

Mayor Discusses Transit

Acting Head of City of Detroit Says Existing Transit Facilities Should Be Doubled

That regardless of the management of Detroit's (Mich.) Municipal Street Railway system, there will always be congestion as long as surface lines alone are depended upon for transportation in Detroit was the opinion expressed by Acting Mayor John C. Lodge, Mayor Couzens' successor, in discussing plans for a rapid transit system and the question of ap-, pointing a man to give his entire time to the management of the street railway system as proposed by members of the Detroit Board of Commerce. According to statements attributed to Mr. Lodge, with the present system operating on a 100 per cent basis and all possible cars in operation, the city would still lack 50 per cent of the necessary transportation facilities.

CONGESTION STILL PREVAILS

He further outlined that the street railway system is operating as efficiently as possible but congestion still prevails during the rush hours and what is needed is a subway system to get away from existing conditions. immediate relief is looked for inasmuch as several years would be required for the construction of a rapid transit system.

For the month of November, last, the Detroit Municipal lines showed a profit of \$91,768 or slightly less than for the month of October. The decrease in net earnings is attributed to the increase in operating expenses because of the cold weather. The maintenance program was kept up during November, which increased the expenditures for the month.

The semi-annual payment of \$500,000 due the Detroit United Railway next June has been paid in advance in order to save the interest on that amount. The department, in making the payment in advance, took the money from the reserve accounts that are set aside in a separate bank account obtained from the pro-rata monthly charge to operations covering deferred obligationsmoney that could not properly be used for other purposes. This was not a question of "robbing Peter to pay Paul" but simply using in advance the money that was intended for the purpose, and thereby creating a saving of approximately \$9,000 in the interest rearned.

BOARD CONTINUES IN CONTROL

According to the present plans the street railway department will continue to be operated and managed by the three-man board of street railway commissioners, and it has been announced that at the end of a thirty-day period, the subject of management will again be considered.

Plans are being considered for the municipal construction of street cars, a large amount of equipment and material having been taken over by the city when the property of the Detroit United

Railway was acquired. The Peter Witt cars ordered by the city last year are being delivered and put into operation as fast as they arrive in the city.

The motor bus line operating on Lynch Road and Mt. Elliott Avenue as a convenience to residents in the section not served by street cars, although operating at a loss will be continued by the Municipal Railway Department. The loss for the last eleven days in November after the service was started by the city on Nov. 19, amounted to \$265.

Small Property Makes Fine Showing

At a meeting of the directors of the Charlottesville & Albemarle Railway, Charlottesville, Va., the regular semiannual dividend of 3½ per cent on its preferred stock was declared, while a 5 per cent with an extra 1 per cent was declared on the common stock, making 10 per cent for the year on the common, which paid 4 per cent June 30, 1922. Both dividends were paid Dec. 21, so that the stockholders had the use of the dividends for Christmas.

The company had a net surplus for the eleven months ending Nov. 30, 1922, after the payment of all fixed charges, including dividend on preferred stock,

of \$85,104.

Christmas gifts of five new crisp \$5 bills were made to each employee regardless of how long he had been employed. A letter from the president John L. Livers, accompanied each gift, thanking them for their co-operation during the year.

The company was 100 per cent free of accidents of any kind during the year. It is one of the few electric railways which did not change its rate of fare from 5-cents, even during the war, and its traffic has increased rapidly in spite of the increasing number of automobiles in Charlottesville.

An additional turbine of 1,500 kw., was installed and paid for out of the earnings during the year. The company also purchased thirty of its \$1,000 first mortgage bonds.

The company operates 3.5 miles of road with nine cars and does general lighting and power business.

Progress Noted in Ten Years Operation

The tenth anniversary of the opening of the San Francisco (Calif.) Municipal Railway was celebrated by officials and employees of the company on Dec. The progress in the ten years operation is noted in the statistics of the property. At the start the system consisted of 10 miles of single track, ten cars and seventy-five employees. The city now owns 67 miles of trackage, divided into ten routes, and two bus lines, 209 cars and includes 1,050 employees.

According to Mayor Rolph, the valuation of the system is \$7,150,000 and up to Nov. 1, 1922, a total revenue of \$20,-412,000 had been paid by the users of the city's lines.

Scek Permanent Relief from Massachusetts Excise Tax

A committee has been formed by the street railway companies of Massachusetts to put before the new Massachusetts Legislature their proposition for a permanent exemption from the provision of the so-called excise tax. This tax was temporarily removed from being operative on street railway companies during the years 1920 and 1921, when the companies in that State were so handicapped by adverse financial circumstances. The abatement was then further extended to April, 1923. The Boston Elevated Railway, due to its special charter, has never been under the provisions of this tax and it is the only street railway at present not concerned with this legislation.

In the last few years several factfinding and investigating committees of the Legislature, as well as the Public Utilities Commission, have gone on record as favoring the abolition of the excise tax so far as applied to electric railways in that State. It has been pretty clearly demonstrated to the public and to the legislators that such a tax is merely an added burden on the car-riding public, which results either in increased fares or diminished service.

The committee which has been formed is now doing missionary work among the Boards of Trade and Chambers of Commerce in the various communities in which the street railway companies operate. They hope to create a sufficient public sentiment to point out to the new Legislature the advisability of permanently removing the street railway companies from the operation of this tax.

Kept Public Informed in 1922

What the Ohio Committee on Public Utility Information accomplished in its second year toward building a better understanding between the people and the utility industry in Ohio is told in its pamphlet report entitled "Informing the Public and Gaining Its Support."

The Ohio committee was formed two years ago. Its publicity activities are in charge of Benjamin E. Ling. The report for the second year tells how group co-operation in that time has promoted better public relations. In 1922 102 utility companies actively supported the Committee, against thirty-nine supporters in the first year of its exist-The fact that Ohio newspapers gave their interest and support to the committee's activities is evidenced by the fact that 290 papers in 187 different cities and towns used 22,958 column inches, approximately 1.148 solid columns of the material sent out during the year, mainly in the committee's weekly News Bulletin. In the first year these figures were 16,584 and 830 respectively. Another method of learning about fair play for the utilities was the public address which 20,000 business men heard. Under the auspices of the Ohio committee eighty-six public talks were delivered before civic organizations during the year just ended.

Financial & Corporate

Montgomery Purchase Negotiated

Local Chamber of Commerce Behind Proposal Under Which Alabama Power Will Take Utilities

The Alabama Power Company will take over the street railway system of Montgomery, the two lighting companies and the gas service when its purchase of the properties is approved by the Public Service Commission. Thomas W. Martin, president of the Alabama Power Company, announced at Montgomery on Dec. 28 that negotiations for the purchase of the properties had been concluded following the indorsement of the proposal by the Montgomery Chamber of Commerce, and other interests of Montgomery, and that an application for the approval of the purchase would be submitted to the Public Service Commission.

No statement was made regarding the purchase price. The announcement of the purchase subject to the approval of the Public Service Commission was made following a meeting of the Chamber of Commerce, which resulted in the unanimous indorsement of the proposal. The Montgomery Light & Traction Company and Montgomery Light & Water Power Company, which control the street car service, lighting service, power service and gas service, have been administered by the bankrupt court for several years through S. B. Irelan, receiver of the two companies.

The Chamber of Commerce of Montgomery initiated the negotiations several months ago, according to announcement, as a result of many inquiries from companies which desired to locate in this territory if adequate electric power could be provided. W. F. Black, secretary of the Chamber of Commerce, told the conference of members of the organization that several concerns have recently sought to enter this territory, but had found the power rates on some classes of industry would not compare favorably with other parts of the South. He said this would be changed under the rates of the Alabama Power Company.

Thomas W. Martin, president of the Alabama Power Company, and Col. R. A. Mitchell, vice-president, in talks to the members of the Chamber of Commerce told of the negotiations for the purchase of the property which had been started as a result of the demand for additional and less expensive power. Colonel Mitchell said the power company has an organization adequate to care for the power and lighting needs of the Montgomery territory as well as the gas and street railway service, and that certain important changes in the service would be made which would be of public interest.

Following addresses of various members of the Chamber of Commerce a of New York,

resolution was unanimously adopted "expressing the view that it would be to the interest of the district to have the Alabama Power Company take over the utilities and offering the co-operation of the Chamber of Commerce in working out any further details."

Service Discontinued

The prolonged controversy between the city administration and the South Carolina Gas & Electric Company, Spartanburg, S. C., reached a crisis on Dec. 31 when the company discontinued all car service without notice. . The cars did not leave the carhouse at all that day. The company issued a statement in the form of an advertisement reciting its efforts to reach an agreement with the city and stating that "it has become imperative to discontinue operating the railway, at least for a time." Apparently the city officials were without any notice of the company's intentions. Following the discontinuance of the cars, Mayor John F. Floyd declined to make any statement.

The South Carolina Gas & Electric Company is successor to the South Carolina Light, Power & Railway Company. The company owns the street railway system, the gas plant and supplies the city with light and power from Gaston Shoals, a 12,000-hp. plant on Broad River.

After the foreclosure and reorganization of the property last August, the owners advanced a plan to substitute bus operation in districts where the railway lines were unprofitable, but the city never acted on the matter. This is the issue on which the two split.

Takes Formal Possession of Newly Acquired Property

The Rochester & Syracuse Railroad has formally taken possession of the Empire State Railroad Corporation, in which it purchased controlling stock recently. The details of the Rochester & Syracuse acquiring the stock of the Empire State Railroad were outlined in the ELECTRIC RAILWAY JOURNAL issue of Dec. 9, 1922.

Officers elected by the new company were: President, Alexander H. Cowie; vice-president, Talmadge C. Cherry; secretary, M. V. White; treasurer, W. K. Zinzmeister. Mr. Zinzmeister was named auditor; D. E. Crouse, chief engineer; H. E. Motsiff, superintenedent; H. C. Stanton, general freight and passenger agent; R. S. Messenger, claim and tax agent; Milton Badgero, purchasing agent.

The board of directors includes Messrs. A. H. Cowie, Carleton A. Chase, T. C. Cherry, W. K. Zinzmeister, W. J. Harvic, James M. Gilbert, Frederick W. Barker, M. V. White and W. O. Morgan of New York,

Report Shows Decrease in Deficit

For the fiscal year ended June 30, 1922, the Interborough Rapid Transit Company, New York, N. Y., shows a deficit of \$2,766,797. This compares with a deficit of \$4,464,826 for 1921 and a deficit of \$2,235,835 for 1920. The accompanying table shows the outstanding items of the report as based on figures filed with the Public Service Commission.

At a special meeting of the stockholders, the by-laws were amended increasing the number of directors from fifteen to eighteen. The personnel of the new board is as follows: For the term ending September, 1923—August-Belmont, Edward J. Berwind, Mortimer

	1922	1921
Gross revenue	\$53,540,859	\$55,031,941
Operating expenses	32,272,509	36,024,646
Net revenue	\$21,268,350	\$19,007,295
Net revenue	2,802,823	2,735,694
Operating income	\$18,465,527	\$16,271,601
Other income	652,875	639,123
$Grossincome_*\dots,\dots,$	\$19,118,402	\$16,910,724
Charges	\$21,885,199	\$21,375,551
Deficit	2,766,797	4,464,827
Previous surplus	\$2,242,878	\$7,093,101
Credits	19,343	34,779
Deficit	\$504,576	*\$2,663,053
Appropriations	20,290	1420,175
P & L deficit	†\$524,866	*\$2,242,878

Surplus.
 † Exclusive of accruals under Contract 3 and related certificates, payable from future, carnings.
 † Includes \$394,757 loss upon sale of Liberty bonds.

N. Buckner, Charles Day and Alfred Skitt; for the term ending September, 1924—Thomas I. Parkinson, Robert C. Rathbone, Samuel W. Rayburn. F. de C. Sullivan and Cornelius Vanderbilt, and for the term ending September, 1925—Bertram Cutler, Frank Hedley, Grayson P. Murphy, Frederick H. Ecker and William C. Potter.

The three additional members, who will represent the public officials, as provided in the recently adopted plan of readjustment, were named on Jan. 4 by the Transit Commission. They are Abel E. Blackmar, William W. Niles and Herman A. Metz.

Traffic Decreases in 1921 in Washington

According to the annual report of the Public Utilities Commission of the District of Columbia 197,374,924 passengers were carried by the two electric railway companies during the calendar year 1921. Of that total the Washington Railway & Electric Company hauled 103,502,136, while the Capital Traction transported 93,872,788.

These figures showed that both companies suffered a reduction in volume of traffic in 1921, as compared with the year 1920, when the Washington Railway & Electric carried 104,900,024 and the Capital Traction, 95,375,179.

The report also shows that the Washington Railway & Electric Company operated more car miles during 1921 than the Capital Traction Company, the figures being 10,682,222 and 9,536,478 respectively.

Announces Appeals Taken on Tax Payment

Appeals to the United States Supreme Court have been taken from the judgment won by King County, which required the Puget Sound Power & Light Company, Seattle, Wash., to pay taxes, now totaling more than \$500,000, on the street railway for the year that ownership was transferred to the city. This announcement was made recently by Deputy Prosecutor Howard A. Hanson, who has handled the litigation for the county for three years.

The street railway was transferred to the city on March 31, 1919, sixteen days after the state tax commissioner had placed the valuation on the property. The company's attorney asserted that the property became public property before the tax was due, and that taxes for 1919 could not be collected. The King County Superior Court and the State Supreme Court ruled that the tax was due when the transfer was made.

The city opposed the county and joined with the company in combating the tax, principally because the transfer contract provided that the company and city should pay the tax, if any were levied, proportionate to the time each owned the railway lines during 1919. On that basis, the company should pay one-fourth the tax and the city three-fourths.

However, the county has not recognized this agreement and is endeavoring to collect the tax entirely from the company, leaving it the company's duty to collect later from the city. The company, individually, and the company and the city, jointly, have each taken an appeal to the United States Supreme Court. The hearing has not been set.

The tax of \$401,018 has been and is drawing 15 per cent interest, so that it is now well over the half million mark. The interest is accumulating at the rate of about \$5,000 a month.

Adjustment Plans Announced

A plan providing for the retirement of its scrip indebtedness and adjustment of accumulated dividends on its preferred stock has been announced by the Commonwealth Power, Railway & Light Company, Grand Rapids, Mich. Holders are being offered preferred stock on the basis of one and one-third shares of 6 per cent, cumulative preferred stock of the Commonwealth Power Corporation for each share of 6 per cent preferred stock of the Commonwealth Power, Railway & Light Company with accumulated dividends of \$19.50 in scrip at par or in cash.

Auction Sales in New York.—At the public auction rooms in New York, there were no sales of electric railway securities this week.

Takes Over New Business.—Bonbright & Company, Inc., dealers in investment securities, New York, N. Y., has announced the acquisition of the business of Charles L. Murphy & Company. Mr. Murphy has become identified with Bonbright & Company.

Common Stock Increase Approved.—At a special meeting of the stockholders of the Manila (P. I.) Electric Company the proposal to increase the common stock from \$6,000,000 to \$10,000,000 was approved.

Bond Issuance Authorized.—The Public Service Commission has authorized the Indiana Service Corporation, Fort Wayne, Ind., to issue \$750,000 in first mortgage bonds to cover capital expenditures. No decision has been made on this bond disposition.

Issue Approved.—The department of Public Utilities has approved the issue by the Boston (Mass.) Elevated Railway of \$700,000 of 6 per cent thirty-year bonds for the purpose of refunding a similar amount of West End Street Railway bonds maturing Jan. 1, 1923.

Abandonment Authorized.—The Public Service Commission has granted the application of the Pennsylvania & Maryland Street Railway, Elk Lick, Pa., to abandon a section of its line at Salishury, Somerset County. Vigorous opposition to the abandonment had been made.

Will Buy Line.—The Goodall interests of Sanford, Me., are reported to have completed arrangements for buying the Sanford-Cape Porpoise trolley line which for several years has been operated by receivers. The line forms an important link in the Atlantic Shore Line between Biddeford and Kittery.

Approves Proposed Merger.—Attorney General Jesse W. Barrett has approved the proposed merger of the Springfield (Mo.) Traction Company and the Springfield Gas & Electric Company. The greater portion of the stock of both the traction and gas companies is owned by the Federal Light & Power Company, New York, N. Y.

Made Director.—Eugene E. Thompson of Crane, Parris & Company, Washington bankers who recently negotiated the purchase of 27,500 shares of common stock of the Washington Railway & Electric Company, Washington, D. C., has been elected a director to succeed Bates Warren, who resigned as a member of the noteholders' protective committee which sold the stock.

Payment Date Announced.—All of the outstanding ten-year 8 per cent sinking fund equipment trust gold certificates of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., dated Oct. 1, 1920, have been called for payment April 1, 1923, at 107½ and interest. Redemption will be made at the office of Dillon, Read & Company, New York, N. Y.

State Regulating Commission Approves Discontinuance of Line.—On account of insufficient patronage to meet operating costs, the Pacific Electric Railway, Los Angeles, Calif., was authorized by the State Railroad Commission, in a recent decision, to abandon its Beverly Hills-Coldwater Canyon line of 1.2 miles. The company's receipts on this line for the first nine months of the past year were \$2,345, while the direct operating charges were \$5,147, or a deficit of \$2,802, according to

the evidence submitted at the hearing. The commission in its decision notes a divided sentiment among residents and property owners who appeared as witnesses. Some insisted that the line should be retained, or if discontinued that a bus line should be substituted. Others expressed a desire for the immediate abandonment of the line and removal of the tracks, claiming that the cars adversely affected property values. The commission further found available traffic would not justify a bus line.

Balance Amounts to \$555,621.—The Republic Railway & Light Company, Youngstown, Ohio, for the twelve months ended Nov. 30, 1922, reports gross earnings of \$7,956,506, against \$7,433,635 for the twelve months ended Nov. 30, 1921. The balance for depreciation, dividends and surplus amounted to \$555,621, an increase of \$239,678 over the surplus for the year ended Nov. 30, 1921.

More Than a Million in Surplus.— The United Light & Railways Company, Grand Rapids, Mich., for the twelve months ended Nov. 30, 1922, reports gross earnings from all sources of \$11,-648,359, against \$11,407,983 for the twelve months ended Nov. 30, 1921. The surplus earnings available for depreciation, debt discount and common stock dividends amounted to \$1,059,739. This compares with \$736,772 for the twelve months ended Nov. 30, 1921.

Remarkable Business for Christmas Rush.—During the six days preceding Dec. 24 the Boston (Mass.) Elevated Railway had the largest gross receipts in its history for a six-day period. Saturday, Dec. 23, was the heaviest of the six days, the receipts for that day being \$124,718. The total for the six days was \$662,350. In the same period the Eastern Massachusetts Street Railway collected \$197,907 in fares, as against \$184,566 during the corresponding six days in 1921.

Traffic Increases.—Nearly 6,000,000 more passengers were carried by the Public Service Railway, Newark, N. J., in November than during the month of November, 1921, as shown in the monthly statement filed in the Federal Court at Trenton. In November, 1922, 37,757,161 passengers were carried. Notwithstanding an increase of 6,000,000 in the number of passengers in November, the number paying the base fare of 8 cents was reduced by 1,353,903, with a corresponding increase in the number of tokens bought and used.

Purposes of Issue Explained. — The issue of \$150,000 first mortgage 7 per cent bonds of the Hannibal, (Mo.) Railway & Electric Company authorized by the Public Service Commission and referred to in the Electric Railway JOURNAL, issue of Dec. 2, will be for the following purposes: \$100,000 to be used for refunding purposes, \$20,000 for retiring its present floating indebtedness and \$30,000 to be placed in the hands of the board of trustees for extension of service and improvements. The company has filed with the Secretary of State a certificate of increase in capital from \$100,000 to \$150,000.

Traffic and Transportation

Authorizes Operation of Jitney Buses in Emergency

Despite court rulings and the opposition of the city law department, Mayor Frank X. Schwab of Buffalo has declared an emergency and has authorized the operation of jitneys on all streets in the city of Buffalo. The City Council of Buffalo by unanimous vote upheld the action of the Mayor and by resolution the Council authorizes the operation of jitney lines in Buffalo until service on the lines of the International Railway is considered adequate.

Mayor Schwab has issued an order to the chief of police directing the police department not to interfere with the operation of jitney lines while the so-called emergency exists. The city law department gave an opinion to the Mayor and members of the City Council in which it ndvised against the declaring of an emergency and said the Mayor and the Council were without authority to authorize the operation of jitney lines in the city.

In commenting upon the action of the Mayor and the City Council, Henry W. Killeen, of counsel for the International Railway, said:

it was a Central Labor Council act. The emergency was declared after the Councilmen had counted the noses of 600 or 700 at the hearing who were hostile to the railway. It was a grandstand play. My suggestion to the Councilmen is that they count noses of the thousands who were not at the Council meeting.

Tens of thousands of passengers are being carried daily by the independent jitney drivers of the city, who are operating on all streets upon which the International operates car lines. Regular terminals have been established at downtown points were jitneys take on their loads, and many str.kers are acting as starters at the central loading points.

Normal service is being given on all local lines of the International and the company has more platform men than necessary to operate ears, according to Herbert G. Tulley, president of the International. He explained that more passengers are riding every day and that in so far as the company is concerned the strike of the employees is a dead issue. The strike has been in progress since July 1, 1922.

One-Man Cars Scheduled for February

One-man cars will be operated in Cincinnati beginning Feb. 1 by the Cincinnati (Ohio) Traction Company. This announcement was made by A. Benham general manager of the traction company, following a conference with Jerome Kuertz, Street Railroad Director, regarding the use of the proposed cars, seventy-five of which have been under construction for months at the shops of the Cincinnati Car Contpany.

Two important questions in connection with the new cars have not yet been settled. One is the problem as to which lines the first of the new cars are to be operated over and the other is whether or not the cars will be operated at the very start as one-man cars or with a crew of motorman and conductor. The latter is a likelihood for the cars are adaptable to both forms of operation. These matters will be decided in the near future, Mr. Benham stated.

The new cars are different in some respects from any conveyance yet seen in Cincinnati. In design they give the impression of much roominess inside. They are 43 ft. long and weigh 28,000 lb., 10,000 lb. less than the double-truck cars now operated by the traction company. They will accommodate forty-six passengers seated and almost as many more standing.

A survey of the entire system of the traction company has been under way for several weeks and it is stated that it would be impracticable to operate one-man cars on all of the lines.

Through Freight Arrangements Effected

The Winona Interurban Railway, Warsaw, Ind., has completed traffic arrangements with the Wabash Railway (steam line) for through freight rates and divisions on both car load and less than car load freight. Considerable tonnage will be handled under this arrangement since it opens up new routings which have been denied shippers in the past.

The Winona Interurban Railway is one of the pioneers in effecting operating arrangements with steam lines and this is one of the very few arrangements of its kind which has up to this time been made in this country.

J. C. Schade, general manager of the Winona company, has always been an advocate of the idea that transportation, both steam and interurban, has reached the place where co-operation is a vital necessity to the industry as a whole.

Five-Cent Fare on Main Line

The Public Utilities Commission has reached a decision whereby Norwalk is to pay a 5-cent fare on the West Avenue line, which is the main line of the city, and the base fare for other places will be 10 cents, or three tokens for a quarter, each token representing a 10-cent fare.

The city of Norwalk has been on a trial basis for the 5-cent fare for the past year, and several hearings were held from time to time, but no decision reached, until this one which makes the fare of Norwalk, that is outside the West Avenue line, the same as elsewhere on other lines of the Connecticut Company, exclusive of the Bridgeport division.

Seven-Cent Fare Extended

The 7-cent fare on the lines of the United Railways, St. Louis, Mo., has been indefinitely extended by the Public Service Commission.

J. L. Harrop, chief engineer of the commission, estimated that the company's net income for 1922 on the 7-cent fare will be \$3,465,486, which, the commission's order states, represents a return of only 6.93 per cent upon a valuation of \$50,000,000, 6.30 per cent upon \$55,000,000 and 5.78 per cent upon \$60,000,000. Mr. Harrop estimated the total revenue passengers in 1922 at 286,000,000, total revenues at \$20,167,886, and total expenses at \$16,702,400.

Assistant City Counselor Dolan, who appeared in opposition to continuance of the 7-cent fare, argued that the company was collecting more than necessary for depreciation and could effect economy by inaugurating a "skip stop" system, some one-man cars, improving fare collection methods and rerouting ears. Power, he argued, will be reduced in cost because of reduction in coal prices. He suggested a 6-cent fare or sale of tokens at three for 20 cents. The commission disagreed with City Counselor Dolan upon each point.

The commission had set the valuation case for argument on Jan. 15, but the hearing may be postponed. Experts of the commission and the company have submitted inventories of the physical property.

The orders stated that in view of the income accounts of 1922 and the status of the valuation case the existing fare should be extended until the commission fixes the fare valuation of the property.

Will Change Numbers for Names in Denver

In an effort to bring about a more personal relation between their employees and the public, The Denver (Col.) Tramway has arranged to have its motormen and conductors known to the public by name.

Neat metal plates, bearing the names of the conductor and motormen, are to be displayed on the front of the fare box in each street car in Denver. The name plate system has already been put into operation on one division and will be extended to include the other divisions as promptly as the plates are received from the manufacturer.

Up to the present time members of the car crew have been known to the company patrons by number only. Under the new system, each passenger who boards a car can see, as he pays his fare, the name of the conductor in charge and the name of the motorman who is operating the car. If he wants to commend the handling of the car or if it displeases him, he knows exactly whom to praise or blame.

The theory of the name plate system is that acquaintance between passenger and car crew improves service. Conductor and motorman are more attentive and more efficient when they are known by name to the persons whom they serve.

Railway Files Brief in Rate Case

Public Service Railway Contends Brief of Commission's Counsel Ignored Facts, Misconstrued Portions of Evidence and Attempted to Support Board's Contentions by Erroneous Use of Statistics

An answer to the brief of counsel for the Public Utility Commission in the fare rate and confiscation case hearing before Thomas G. Haight, as master in the United States District Court, was filed by Frank Bergen, Edmund W. Wakelee, and Robert H. McCarter, representing the Public Service Railway, Newark, N. J., on Dec. 30. It is a document of more than 150 pages, its length being due mainly to the thoroughness with which counsel analyzed and dissected the points set up in the brief filed by the lawyers for the board and other defendants.

FACTS IGNORED BY BOYD'S BRIEF

Statements are made, followed by quotations from the opposing brief and from the testimony adduced during the hearing, to the effect that the brief of counsel for the board ignored certain facts, misstated or misconstrued portions of the evidence and attempted to support contentions by the erroneous use of statistics or by attributing figures to witnesses who did not testify as to them.

In referring to objections set forth in the defendant's brief to the company's description of the proceedings before the utility board which led to the order of July 24, 1921, the railway's counsel say:

There is, however, more severe disapproval of the board's proceedings than the plaintiff has expressed, indicated by the fallure of the defendants in their brief to attempt to justify the reasons assigned by the board for the action that made this litigation necessary except by a few duifful and commonplace generalities. The authors of the defendant's brief seem to have found it advisable to ignore the reports or opinions of the board as indefensible, and proceed to make an effort to construct a defense along other lines, apparently with the board's approval.

The brief of the company declares that the board in its orders ignored certain cases defining the company's rights, decided by New Jersey courts. In this connection the brief adds:

The defendants' brief is not only remarkable for its change of base, but for its omissions also. No attempt whatever is made to explain how items of property of the plaintiff, proved by unquestioned evidence to be worth at least \$30,430,630, were passed over by the board when writing its report in the valuation case with repeated statements that they would be considered in fixing the amount of going value, and when the board came to fix the amount of going value only \$12,000,000 was allowed.

Addressing itself to the method adopted by counsel for the board in attempting to arrive at a valuation of the company's property, the brief points out that the defendants have disregarded the cost of reproduction method for ascertaining value, which they formerly insisted upon when costs were low and

Falling to find any method or theory of valuation heretofore employed that could be used even plausibly for their purpose, they have recently fallen into the habit of following every practice or method ever employed.

but only so far as each could be used to afford a seeming support for a sum less than the true value of the property. They refuse to follow any method to its logical conclusion. As nearly as the defendants' brief indicates any theory of valuation they entertain, it seems to be that the physical property of a utility corporation is to be appraised as second-hand material, using pre-war prices, and then add the expense of putting the pieces together at the cost of construction prevailing seven or eight years ago; and that only physical property presently in existence is to be included in any appraisement for a rate base. Nothing is more clearly settled than that such a valuation would be illegal, and besides it be grossly unjust.

Much space is given to consideration of United States Supreme Court decisions in similar rate cases with especial reference to principles laid down for the determination of value and elements of value. It is then pointed out that while counsel for the board alleged in their brief that the company in its brief did not present the facts correctly, the board's counsel failed to point out a single error or misstatement of fact. The company's brief then goes on to say:

In professing to estimate the value of the plaintiff's property counsel for the deriendants now disapprove of the board's valuation in substantially every particular.

It is asserted that the Ford, Bacon & Davis valuation was disregarded and that figures introduced by Dean Cooley and the board's own expert, Mr. Feustel, were at times misused or employed in a misleading and erroneous manner.

Numerous excerpts from the testimony in the case are quoted to refute assertions made by counsel for the board or to expose the fallacy of claims set up by them. Chapters are devoted to the consideration of contingencies, engineering and superintendence, law expenditures and administration, interest during construction, taxes during construction, organization and development, cost of money, promoters, remuneration, going value and development cost, land and right-of-way, depreciation, appreciation, historical cost, valuation made by the State, electric power plant lease, the tables set up by the defendants, and the confiscatory character of the rates fixed by the Public Utility Board.

VALUE CLAIMED FOR POWER LEASE

The testimony covering the value of the power station lease is gone into at great length, the company maintaining that part of the value of the lease is measured by the value of the property turned over to the electric company in 1910, and that the lease has an additional value measured by the capitalized These savings in operating expenses. savings according to expert witnesses averaged \$1,194,296 a year, which capitalized at 8 per cent amounts to \$14,928,700. Defects and inaccuracies in the testimony offered by Expert Buck for the board, are set out in de-

tail and words are not disguised in referring to certain statements set forth in the board's brief. To quote an example:

The third reason given by the defendants why nothing should be allowed for the leased property is that Mr. Osgood testified that the value of these plants is nothing. This is another mis-statement of facts by defendants' Counsel. Osgood said nothing of the kind.

Attention is directed to a series of "calculations" made by Mr. Petty, one of the board's witnesses, which the brief points out were grossly inaccurate as compared with the facts. Mr. Petty calculated the company would earn \$6,360,000 the first year under the rate permitted by the court; the actual earn-The defendants ing was \$5,593,958. admit that if the board's rate had been in force the earnings would have been some \$300,000 less than they were but General Manager Danforth of the railway testified that they would have been \$1,500,000 less. In connection with these losses accrued during the period the board refused to allow sufficient rates, reference is made to the Supreme Court decision in the Hackensack Water Company case and the brief adds:

In any event the results of operations for the year under the court's permitted rate conclusively show that the rates fixed by the board would not produce a fair return upon the value of plaintiff's property, as proven in this case, and are therefore confiscatory.

upon the value of plaintiff's property, as proven in this case, and are therefore confiscatory.

Beginning a summary of the brief, Counsel go on to say: "(1) Several years ago the plaintiff, owning one of the largest street rallway systems in the country, found the cost of maintaining and operating its property rapidly increasing and it continued to increase until it had more than doubled (P. 32, and plaintiff's brief, page 7). The highest courts of New Jersey, with the facts before them, held that the plaintiff was entitled to increase its rates of fare sufficiently to provide for the increased expenses (O'Brien case, 92 N. J. L., 44; aff'd ib., 587,588) and that a valuation of its property was not necessary (p. 590). The New Jersey courts also held that rates should be "sufficient to induce the investment of capital in the business, and its continuance therein," which clearly the public Interest requires (84 N. J. L., 463, 474; aff'd 87 N. J. L., 597; plaintiff's brief, pp. 4 and 5). Increased rates could not be established without the consent of the board of public utility commissioners, or long and costly litigation. Timely and repeated applications were made by the plaintiff for the income to which it was entitled, but they were denied by the board, except in part. The increases permitted were insufficient in every instance to provide for the increased expenses (p. 38, and Trans., p. 386). The rates allowed by the board during the four years 1918-1921, inclusive failed to produce sufficient money to provide for these increased costs over the year 1916 by approximately \$12,000,000 (plaintiff's brief, p. 160). The income during those years was many million dollars less than the amount now stated by the board to be reasonable. (Exhibit P.38).

The summary sets forth that the primary question in this case is:

What is the value of the plaintiff's property used in its business?

It goes on to answer the question by citing United States Supreme Court decisions to the effect that the ascertainment of value "is not a matter of formulas, but there must be a reasonable judgment having its basis in a proper consideration of all relevant facts," and adds, "The reasonable judgment to be exercised in ascertaining the value of the property of a utility corporation must be the judgment of those familiar with the property in question and with

utility property generally. It is not the ipse dixit of anybody who chooses to assert a figure and call it fair.'

In developing their arguments, counsel for the company refer to the Ford, Bacon & Davis report stating the value of the property to be \$125,000,000, the value of the property turned over to the electric company in 1910, the saving to the railway as the result of the power plant lease; the fact that Mr. Wolff, a witness for the board, testified to a historical value of \$95,000,000 and admitted that his findings were not complete and that he failed to include in his total of \$95,000,000 many items of cost. Also that the utility board since it was created had approved issues of stock and bonds of the plaintiff and the payment of interest and dividends on other securities of the lessor companies to the amount of \$71,029,650; that the utility board had approved a consolidation agreement of the railway company and the Newark Terminal Railway, dated Dec. 7, 1915, which agreement fixed the capital stock of the company \$39,250,000 and that subsequent issues of stock of the plaintiff amounting to \$10,750,000 had been approved by the utility board in 1916 and 1917. In this connection counsel pointed out:

The utility board, familiar with the law The utility board, familiar with the law and with plaintiff's property cannot now deny the validity or value of the stock which it approved, or the value of the property represented by the stock when so approved, and the control of the property represented by the stock when so approved that the value of securities lawfully issued and specifically sanctioned by the State can be impaired or destroyed in the process of rate making. . . . We claim nothing that has not been allowed in other rate cases and sustained by the courts. cases and sustained by the courts.

The brief goes on to the effect:

That a proper consideration of all the testimony in this case must lead to the conclusion that the value of plaintiff's property in these rapidly growing communities, with plaintiff's expacity to meet the increasing transportation needs of the State, is in excess of the amount of its capitalization; that the amount declared by the board of public utility commissioners to be the value of the property is a mere assertion shown to be grossly erroneous by the proof in this case, and that the rates based on the board's alleged valuation are clearly confiscatory.

A table of figures taken from the testimony is set up. It shows among other things that Mr. Feustel, one of the board's witnesses, testified that the reproduction costs of the property hased on prices of July 14, 1921, excluding land, general contingencies, working capital and materials and supplies, organization and development of the project, cost of money, promoters remuneration, going value and power contract resulted in a valuation of \$97,069,741, while Dean Cooley's figure for the same items was \$100,856,658. the small difference, it being pointed out, being largely accounted for by the difference in the interest rate used, Mr. Feustel, the board's main witness, being in substantial accord with Dean Cooley as to the prices of July, 1921. It is shown also that Mr. Feustel admitted that other items should be allowed.

Toward the end of 1921 there was put into effect on the railway a base rate of 8 cents, with four tokens for 30 cents, and a 1-cent charge for each

transfer. This was the result of a condition imposed by the United States District Court for New Jersey in an order restraining the State Board of Public Utility Commissioners from enforcing its finding that the company should charge no more than a 7-cent cash fare, with an additional charge of 2 cents for each transfer. The higher rate is still in force pending the outcome of the court proceeding. The plea of the railway was confiscation of property. The Board of Public Utility Commissioners and the Attorney-General for the State appealed to the United States Supreme Court from the decision of the district court, but the Supreme Court formally declined to advance the application. In the meantime the District Court appointed Thomas G. Haight as special master to take the evidence.

Under the terms of an act passed by the Legislature in 1920 and amended in 1921 Ford, Bacon & Davis were employed by a specially designated state commission to value the railway property. It reported that the value of the property was \$125,000,000. This report was transmitted to the board, which also heard the testimony of other experts, some of whom fixed the value at a much larger amount. On July 14 the board handed down a report and order in which, after throwing out the state's valuation, it fixed the value of the property at \$82,000,000 and decreed a rate of 7 cents, with a 2-cent charge for each transfer, effective Aug. 4, 1921. The contention of the company is for the right to earn a return on a valuation of \$209,898,906.

Cuts Fare to Increase Revenue

The Jersey Central Traction Company, operating from Red Bank to Perth Amboy, New Jersey, will cut the fare in each zone from 10 cents to 8 cents and will discontinue the sale of low rate commutation tickets. In a statement announcing the change in the tariff W. H. Hitchcock, general manager of the company in the Perth Ambay district, said that the company's deficit amounted to \$100,000. It is believed that if the change in rate does not result in increased revenue operation will be discontinued. The company was authorized to increase its rates from 7 to 10 cents in June of 1922. The extra fare charge was granted for a six-months period to see if it would increase the revenue of the company.

Will Have Dining Cars .- Dining car service will be started in the spring on the line between Indianapolis and Louisville operated by the Interstate Public Service Company. The dining cars will be run each way three times daily and will have seating accommodations for twenty-four persons.

Two New Passes Adopted .- The Citizens' Traction Company, Oil City, Pa., recently announced the adoption of two new passes. The first pass, which will sell for \$1.25, will be good for a week on Oil City lines. The

second pass, good for both Oil City and Franklin lines will sell for \$3. passes are transferable. This is in accordance with the plan previously announced.

Seven-Cent Fare in Effect.-The new rate of fare provided by the Lima City Railway ordinance, recently passed, went into effect on Nov. 26. The new fare will be 7 cents cash or four tickets for 25 cents. Announcement has been made that five new one-man cars will be in service by Feb. 1.

Reprints Journal Article. - The December issue of the Northern Light, published by the Northern Ohio Traction & Light Company, Akron, Ohio, contains a reprint of an article which appeared recently in the ELECTRIC RAILWAY JOURNAL by Frank H. Warren. The article is entitled "The Customer Is Always Right."

Seven Cent Fare in Danville,-As a result of an action of the City Council a 7-cent fare was to go into effect on Jan. 1 on the lines of the Danville Traction & Power Company, Danville, Va. This rate will remain in force for two and a half years. At the end of that time the 5-cent rate will go into effect. Ticket purchasers will still ride at a 6-cent rate.

More Cars to Be Put Into Service .-The Supervisor of Public Utilities of Dallas, Tex., has made a check of service, passengers carried, etc., of the Ervay-Bryan line of the Dallas (Tex.) Railway and has issued orders for five new cars to be put in service on this line during the morning and evening rush hours. The Supervisor of Public Utilities makes a complete check of all lines in the city once every six months and orders additional cars put in service where needed to keep the service up to the high standard set. Other lines are now being checked.

Authorizes Commutation Books.-The Georgia Public Service Commission issued an order granting the Georgia Railway & Power Company authority to sell individual commutation books on its Stone Mountain and Marietta lines containing twelve tickets each and good for ten days, and family commutation tickets containing ten tickets good for twenty-five days at slightly reduced rates under the regular rate. The Commission declines the petition of the company to discontinue issuing ninetyday and thirty-five-day books.

Demonstrates One-Man Cars,-Practical demonstrations of one-man street cars are being given by the Utah Light & Traction Company on some of its lines in Salt Lake City. These demonstrations are highly successful. Stops to take on and let off passengers are made in approximately the same time that is required on the two-man cars. To avoid any possible confusion or loss of time which might result from the first trials of the new system, an extra man was on hand on each of the cars to make change, issue transfers and demonstrate how entrances and exits should be made.

Personal Items

Harry L. Brown Editor

Harry L. Brown, who has been for some time Western editor of ELECTRIC RAILWAY JOURNAL, at Chicago, and more recently managing editor at New York, has been appointed co-editor of the paper with Henry W. Blake. His appointment is effective with this issue of the Journal and Mr. Brown will be from now on in executive charge of the editorial work.

Mr. Brown is well known in the railway field, particularly in the Central territory. He started his railway editorial work on the staff of Electric Traction soon after graduation in electrical engineering from the University of Michigan. He joined the ELECTRIC RAILWAY JOURNAL staff, at the Chicago office, in 1916, having come with



H. L. Brown

the McGraw-Hill Company a year before as assistant editor of Electrical World. Earlier he was engaged in engineering work with the Aurora, Elgin & Chicago Railroad and Chicago Telephone Company. During the war he was Captain in the Signal Corps, and after the war was co-author of Lauer and Brown's "Radio Engineering Principles." He rejoined the staff of the ELECTRIC RAILWAY JOURNAL in 1919 and "covered" the hearings of the Federal Electric Railways Commission in Washington, thereafter going to Chicago as Western editor. In Chicago Mr. Brown's contributions to and other work for the Journal were of a high character, and when H. V. Bozell, formerly co-editor of the Journal, was appointed editor of Electrical World, Mr. Brown was transferred to New York to become managing editor, and now editor, of ELECTRIC RAILWAY JOURNAL.

The publishers of the JOURNAL believe that with Mr. Brown's acquaintance with the men and problems of the industry, his past experience in editorial work in the electric railway field and his conception of what the paper can do to help the industry, he

will, as a responsible editor, help make the ELECTRIC RAILWAY JOURNAL more and more useful and valuable to the electric railway men and the electric railway industry.

Mr. Coblentz to Retire from Potomac Public Service Company

At the recent meeting of the executive committees and several boards of directors of the Potomac Public Service Company and its subsidiaries Emory L. Coblentz, president of the companies. stated that at his own request he would retire as president of the companies at the time of their annual meetings to be held in January and February next. This announcement, he said, was in accordance with a definite understanding which he had with the officials of the American Water Works & Electric Company when that company purchased the control of the Potomac Company in July last.

Mr. Coblentz further stated that at the request of the officials of the Water Works & Electric Company, he will, upon his retirement as president of the several companies, assume the position of chairman of the several boards of directors and executive committees.
This will include the Potomac Public Service Company: the Chambersburg, Greencastle & Waynesboro Street Railway and the Waynesboro Electric Company with offices in Waynesboro, Pa.; the Potomac Light & Power Company, with offices in Martinsburg, W. Va.; and the Northern Virginia Power Company with offices in Winchester, Va. It was also stated that Mr. Coblentz and his associate still retain large financial interests in the Potomac Public Service Company, and that by occupying the position of chairman of the several boards and executive committees of the various companies, he would remain in touch with their affairs but would be relieved from all strictly operating problems.

Mr. Coblentz stated that he would be succeeded as president of the several companies by M. F. Riley, who has been on the several properties for some time studying their operating problems. Mr. Riley is an experienced public utility executive, having been actively connected with the American Water Works & Electric Company's properties for more than twenty-five years, and at the present time being president of about ten of the water works companies owned by the American Water Works & Electric Company, from which positions he will retire upon assuming the presidency of the Potomac Company and its subsidiaries.

It is understood that no changes in the officers or management of the Potomac Public Service Company are contemplated other than those just mentioned.

Mr. Dalgleish Honored

R. H. Dalgleish, chief engineer of the Capital Traction Company, Washington, D. C., was recently elected president of the Washington Society of Engineers, to serve in that capacity during the current calendar year. This society comprises in its membership most of the prominent engineers in all branches who make their head-quarters at the capital. The honor is a well-deserved one, for there is no more alert, progressive and capable engineer in the District than Mr. Dalgleish. He is one of the most popular of the electric railway engineers and his capability has been recognized, among other ways, by appointment to committees of the American Electric Railway Engineering Association from time to time. For example, last year he was chairman of the committee on equipment, one of the most important in the association. He had previously been a member of this committee. This



R. H. Dalgleish

year he is chairman of the committee on specifications for air tanks, a line of work requiring expert engineering knowledge. His enthusiasm for company section work in the association led to his election, in 1916, to the presidency of the Capital Traction Company section. He has also served as chairman of the Washington section, A.I.E.E.

Mr. Dalgleish is rounding out thirty years of service with the Capital Traction Company, practically his entire professional life. To be sure he did work for a short time with the Eckington & Soldiers' Home Electric Railway, but soon left to enter the electrical department of Capital Traction. He stuck right to his job, improving himself by study meanwhile, until in 1919 he demonstrated that he had made good by capturing the appointment as chief engineer.

Mr. Dalgleish is young yet, only forty-eight, and he looks ten years younger. He has the "pep" of a man of twenty-five. He is a good mixer and handles his varied work with skill and energy, and it is varied because it comprises all branches. He is a graduate of the Cochran Scientific School, now

part of George Washington University, which accounts in part for his analytical attitude toward engineering problems.

Mr. Robertson Made Vice-President and General Attorney

Arthur W. Thompson, president of the Philadelphia Company, recently announced that Andrew W. Robertson had been elected vice-president and general attorney.

Mr. Robertson was born at Panama, N. Y., Feb. 7, 1880. He graduated from Allegheny College in 1906. He attended the Pittsburgh Law School and was admitted to the bar. Soon after he was elected title officer of the Guarantec Title & Trust Company and later trust officer. He became attorney for the Duquesne Light Company and the Pittsburgh Railways, and in 1913 was selected by the receivers as one of their attorneys. In 1919 he resigned this commission to accept the appointment as general attorney of the Philadelphia Company and affiliated corporations.

As vice-president and general attorney he will handle any necessary legal business and will have special duties assigned to him by the president.

Mr. Horn Resigns from I. T. S.

John M. C. Horn, comptroller of the Illinois Traction System, Peoria, Ill., with headquarters at Champaign, Ill., resigned that position, effective on Jan. 1, 1923. Mr. Horn has been with the Illinois Traction System and its component companies for fourteen years, having served in the general offices at Champaign during that entire time. The position vacated by Mr. Horn will be filled by T. A. Smith, supervisor of capital expenditures for the same company, who, for the present, will take over the work of both offices.

Changes in Duties Announced

H. A. Benjamin, general freight and passenger agent of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, has resigned to engage in other business. His position has now been abolished.

The jurisdiction of Maurice A. Welsh is withdrawn from all matters pertaining to maintenance and is extended over the traffic department with the title of superintendent and traffic manager with office at Waterloo.

T. E. Rust, chief engineer, will now have authority over the mechanical department with office at Waterloo.

Mr. Couch a Potentate

H. C. Couch, president of the Arkansas Light & Power Company, and of the street railway in Pine Bluff, the former operating public utilities in forty-five cities and towns in Arkansas, was elected Potentate of Sahara Temple, Ancient Arabic Order of the Mystic Shrine, at the annual election on Dec. 7. Mr. Couch is also serving as president of the Chamber of Commerce of Pine Bluff and is a member of the board

of the Arkansas Y.M.C.A., Henderson-Brown College, and of the Bankers Trust Company of Little Rock. He is secretary of the Caddo River Power & Irrigation Company, which will develop hydro-electric power on the Quachita and Caddo Rivers in Arkansas, the electrical energy to be distributed over the 500 miles of the high-voltage lines of the Arkansas Light & Power Company.

Frank R. Coates, president and general manager of the Community Traction Company, Toledo, Ohio, is now dividing his time between the New York and Toledo offices.

Col. John H. Trumbull, a director of the Bristol & Plainville Tramway Company, Bristol, Conn., has been appointed chief of ordnance on the staff of Governor-elect Charles A. Templeton of Connecticut.

Walter S. Dickie has resigned from the administrative staff of the Berkshire (Mass.) Street Railway to take up the duties of register of deeds for his county, to which office he was recently elected.

W. Nelson Smith has been made consulting electrical engineer of the Winnipeg (Man.) Railway. Mr. Smith, who has made a study of self-corrosions of cast iron, was recently elected a Fellow of the Royal Society of Arts of London.

II. C. Young, purchasing agent of the International Railway Company, Buffalo, N. Y., has been elected president of the Purchasing Agents' Association of Buffalo for 1923. He has been actively associated with the organization in Buffalo for many years.

Col. W. G. Ara, assistant engineer of maintenance of way Illinois Central Railroad, has been appointed assistant engineer of the Chicago terminal improvement. This improvement work is under an organization independent of the general engineering department of the railroad.

G. T. Hellmuth, who has been general claims attorney of the Chicago, North Shore & Milwaukee Railroad, was appointed on Jan. 1 claims attorney also of the Chicago Elevated Railroads. Mr. Hellmuth's connection with the North Shore began in 1911, a year following his graduation from the John Marshall Law School, Chicago.

B. H. Meyer has been elected chairman by the Interstate Commerce Commission to serve from Jan. I, 1923, to Jan. I, 1924. He succeeds Charles C. McChord. The election of Mr. Meyer is in line with the plan of organization of the commission under which the office of chairman is held by each member in turn for one year.

Ralph E. Tevebaugh, who for the last three years has been in charge of the traffic department of the Union Traction Company of Indiana, with head-quarters in Indianapolis, has been added to the rate department of the Indiana State Chamber of Commerce. Ile was for two and one-half years in the rate department of the Indianapolis & Cincinnati Traction Company.

Lovick P. Miles has been appointed general counsel of the Memphis (Tenn.) Street Railway to succeed the late Gen. Luke E. Wright. The Memphis Street Railway is still in receivership and on this account the appointment of Mr. Miles is subject to confirmation by the Federal Court. Judge Ross has since confirmed the appointment.

Richard Groeninger, veteran Cincinnati newspaper man, has been appointed a member of the Board of Rapid Transit Commissioners by Mayor George P. Carrel of Cincinnati, Ohio. He succeeds Col. William Cooper Procter, whose term has expired as president of the Procter & Gamble Company. The appointment is for ten years at \$3,000 a year. Mr. Groeninger is a resident of Cincinnati. He came from Germany twenty years ago.

Obituary

Stephea C. Hubbell, who served as the first president of the Spring & Sixth Street Railroad, which operated the first street railway in Los Angeles, Calif., died in that city on Dec. 14. He was born in Cattaraugus County, N. Y., in 1841.

F. A. Blackwell, pioneer in railroad building in Cœur d'Alene, Idaho, died recently at the age of 70 years. He came from Pennsylvania, where he had been engaged in the lumber business. He spent a few years in the purchase of timber and in becoming acquainted with the country. In 1903 he started the construction of the Cœur d'Alene & Spokane Electric Railway. This was the beginning of the Spokane & Inland Empire Electric Railway, later extended to Palouse and Colfax by the efforts of Mr. Blackwell and associates.

Charles A. McKinney, former secretary and treasurer of the Consolidated Street Railways of Houston, Tex., and late assistant cashier of the South Texas Commercial Bank of Houston, died recently at his home in that city. Mr. McKinney was sixty-seven years old and had lived in Houston since 1890, when he came to the city to become connected with the street railway lines then owned by O. M. Carter. Later he became connected with the South Texas National Bank and remained with this institution for twenty-seven years prior to his death.

Charles Ruff, well known in the electric railway industry from his connection as master mechanic with the railway properties at Minneapolis, Indianapolis, Buffalo, Anderson and Richmond, Ind., and Lincoln, Neb., died on a Chicago street car early on Dec. 12. He was going to work at the Standard Oil Company shops at Whiting, where he had charge of the department repairing gages, meters, steam traps, etc., for a number of years. Mr. Ruff was an exceptionally able mechanic, especially gifted in handling and instructing men and apprentice boys, and many persons who had worked with him will recall his helpful influence.

Manufactures & the Markets

News of and for Manufacturers—Market and Trade Conditions A Department Open to Railways and Manufacturers for Discussion of Manufacturing and Sales Matters

100 per Cent Increase in Manufacturers' Business in 1922

Survey of the Business Obtained from the Electric Railways by a Number of Manufacturers Shows a Very Substantial Increase in Comparison with Their Sales in 1921—But 1923 Looks Even Better

Summing up the total sales made to electric railway companies during 1922 by a number of manufacturers from whom information was secured by ELECTRIC RAILWAY JOURNAL and comparing this total with the same figure for 1921, the result indicates that on the average the manufacturers derived a gross business which was 100 per cent greater than in 1921. This fine gain in the sales of those who serve the electric railway field gives one of the most direct and tangible evidences of the improving financial condition of the industry. The manufacturers have had some lean years while the railways were in trouble, but the reaction toward fat years is coming with a vim as the railway earnings have come up with increased fares and slightly decreased operating costs. The necessary deferring of great amounts of maintenance and betterment work on the physical properties of the interurban and street railways has naturally made it necessary for the companies to buy, and buy as quickly and as generously as their resources permitted.

FIGURES TELL THE STORY

Some interesting details from a few of the replies received from manufacturers will serve to show what the general trend of business in 1922 was in comparison with 1921. The General Electric Company sold \$16,200,000 worth of equipment to the electric railways in 1922 as compared to \$9,804,009 in 1921. The Westinghouse Electric & Mfg. Company also enjoyed approximately 100 per cent increase in its railway business. The business of the Cincinnati Car Company in 1921 amounted to \$317,750, and increased 900 per cent to the figure in 1922 of \$4,708,485. The National Brake Company had an increase of 40 per cent. The Consolidated Car Heating Company did a business of \$526,000 in 1922 as against \$285,000 in 1921 with the electric railways. The Differential Steel Car Company sold \$240,000 worth of equipment to the electric railways in 1922 as against \$40,000 in 1921, a 600 per cent increase. The International Steel Tie Company sold \$600,000 worth of its ties to the railways in 1922, compared with \$450,000 in 1921. The Johnson Fare Box Company reports that it will start the new year with better prospects

than ever before as it has orders on its books amounting to \$150,000.

The railways indicated some renewed interest in roller bearings during 1922 as shown by the fact that \$5,000 worth of such bearings were purchased from the Stafford Roller Bearing Company, as against practically no electric railway purchases from this company the year before. The Spray Engineering Company, which manufactures spray painting equipment, reports the sale of \$30,000 of this equipment to the railways in 1922, as against \$20,000 in 1921, indicating a growing appreciation of the economy available from this scheme of painting cars and other equipment.

The Electric Railway Equipment Company had an increase of \$50,000 in its sales of tubular steel poles and fittings, and overhead trolley material to the electric railways. The sale of Economy Electric Devices Company watthour meters for use on the cars in-

creased about 200 per cent as compared to last year, and orders for 4,000 undelivered meters were on the books at the close of the year, though delivery is being made rapidly.

ANOTHER BIG YEAR IN PROSPECT

So much for indications of railway purchasing during 1922. Good as this year has been, 1923 looks even better, and substantially so. The development of budget figures covering expenditures for new plant and equipment to be made by the railways during 1923, as compiled by the JOURNAL and printed elsewhere in this issue, indicates that these expenditures during the new year will exceed those of 1922 by two-thirds of another 100 per cent. This means that if no serious nation wide adversity comes upon us, the year 1923 is likely to be one of the best ever experienced for the manufacturers serving the electric railway field.

Pacific Coast Prospects Good

Thomas W. Casey, general manager of the National Pneumatic Company, New York, N. Y., has recently returned from an extended trip to the Pacific Coast. He visited all important electric railway centers between Vancouver and San Diego. Mr. Casey says that the electric railway executives and managers are optimistic. They are facing their problems squarely with a determination to solve them in the best interest of the industry. A very favorable turn in affairs on the coast was noted by Mr. Casey in connection with decisions under which a number of important extensions and improvements will be begun and completed during the year 1923.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 2, 1923

Metals-New York		Paints, Putty and Glass-New York				
Copper, electrolytic, cents per lb	14.687 7.25 36.00 7.30 39.00 22.50 42.00 25.00	Linseed oil, (5 bbl. lots), cents per gal	93 00 12.375 \$1.47 \$4 0% 86.0% 85 0% 6.50			
Smokeless mine run, f.o.b. vessel, Hampton	-0.405	cbarges extra. Wire—New York				
Roads. Somerset mine run, Boston Pittsburgh mine run, Pittsburgh. Franklin, Ill., acreenings, Chicago Central, Ill., acreenings, Chicago	\$8.625 5.375 3.25 3.125 2.325	Copper wire base, cents per lb	16.90 6.50 16.50			
Kansas Screenings, Kansas City	2.50	Paving Materials				
Track Materials-Pittsburgl	n	Paving atone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per aq.yd	\$3,35 3,10			
Standard Bessemer ateel rails, gross ton. Standard open hearth rails, gross ton. Railroad apikes, drive, Pittsburgh base, cents per lb. Tie plates (flat type), centa per lb. Angle bars, cents per lb. Rail bolts and nuts, Pittsburgh base, cents, lb. Steel bars, cents per lb. Ties, white oak, Chicago, 6i n. x 8 in. x 8 j ft.	\$43.00 43.00 2.75 2.42 2.75 4.12 2.00 1.40	Wood block paving 3½, 16 treatment, N. Y., per sq.yd. Paving brick, 3½ x 8½ x 4, N. Y. per 1,000 in carload lots. Crushed atone, 1-in., carload lots, N. Y., per cu.yd. Cement, Chicago consumers net prices, without bags. Gravel, 1-in., on.yd., N. Y. Sand, cu.yd., N. Y.	2.30 50.00 1.75 2.05 2.00 1.00			
Hardware—Pittsburgh	0.70	Old Metals—New York				
Wire nails, base per kcg. Sheet iron, (28 gage), centa per lb. Sheet iron, galvanized, (28 gage), cents per lb Galvanized barbed wire, cents per lb Galvanized wire, ordinary, cents per lb	2.75 3.35 4.35 3.35 2.45	Heavy copper, centa per lb. Light copper, cents per lb. Heavy brass, cents per lb. Zinc, old scrap, cents per lb. Yellow brass, cents per lb (heavy).	12.15 10.60 6.90 4.40 7.00 6.00			
Waste—New York Waste, wool, cents per lb Waste, cotton, (100 lb. bale), cents per lb.: White Colored	15,00 14,00 7,00	Lead, heavy, cents per lb. Steel car axles, Chicago, net ton. Old car wheels, Chicago, gross ton. Rails (abort), Chicago, gross ton. Rails (relaying), Chicago, gross ton. Macbine turnings, Chicago, net ton.	\$18.75 25.75 21.25 33.50 11.75			

Rolling Stock

The Thousand Islands Railway, Ganonoque, Ont., has placed an order for new equipment for the Oshawa Railway. It consists of one electric freight shunter, weighing 43 tons, to be delivered thirty days from the date of placing the order, and electric motor passenger cars to be delivered by April, 1923. The shunter has been ordered from the Canadian Westinghouse Company and the passenger cars are to be constructed by the Ottawa Car Manufacturing Company.

San Francisco-Oakland Terminal Railways, San Francisco, Calif., has ordered for the Key Route system from American Car Company fifty-five double truck cars to be delivered in four to five months and to cost delivered approximately \$14,700 each. Arrangements will be made for one or two-man operation and for three men in two-car trains. Specifications include steel body with end platforms, length over bumpers 44 ft. 10 in., weight 35,000 lb., Brill trucks, four 40-hp. motors, General Electric multiple-unit control and air compressors, twelve side windows, rattan reversible seats for forty-eight passengers, folding steps, pneumatically controlled folding doors on each side of each platform, mahogany interior finish, Hunter illuminated end signs, automatic couplers for both air and electric connections, air sanders, Johnson cash fare boxes and single cash fare registers, push button signal system, safety devices same as installed on the standard one-man safety cars.

Power Houses, Shops and Buildings

Tri-City Railway & Light Company, Davenport, Iowa, will install a new generator and a 35,000-hp, steam turbine and new boilers and auxiliary equipment will constitute part of the \$1,250,000 improvement program.

Louisville (Ky.) Railway has received a building permit for improvements of \$2,750 in the curhouse at West Chestnut Street. This is the third unit in a \$40,000 program by the company for hetter quarters for the men.

United Electric Railways Providence, R. L. has awarded the contract to William H. Hamlyn & Sons Providence for the construction of the new carhouse on North Broadway, East Providence. The structure will be of brick and steel, one and two stories high.

Fort Smith Light & Traction Company, Fort Smith, Ark., is included in a power construction program recently outlined by Byllesby management. The plan will increase the plants and systems of the Oklahoma Gas & Electric Company, Oklahoma General Power Company, the Fort Smith Light & Traction Company and the Mississippi Valley Power Company from their

present capacity of 34,102 hp. to a total of 84,102 hp. a gain of 146 per cent.

Pacific Electric Railway, Los Angeles, Calif., has just recently ordered the materials necessary to install a complete alternating-current electric interlocking plant at La Habra, Calif. The plant will require a 7-lever type "F" electric interlocking machine, operating six style "T-2" signals and four style "M" electric switch movements. Alternating current will be used for both the interlocking and double rail return track circuits through the plant. The Union Switch & Signal Company is furnishing the materials, while the field work will be performed by the railway company's own signal construction forces.

Track and Roadway

Wilmington & Philadelphia Traction Company, Wilmington, Del., is planning to build an extension from the terminus at the Lobdell plant to the new Marine Terminal.

New York, N. Y .- The Transit Commission has awarded three contracts for construction work. The Fort Hamilton extension of the Fourth avenue subway, Brooklyn, awarded to T. A. Gillespie Company for \$1,485,151; Fourteenth Street eastern lines has been awarded to Frederick L. Cranford, Inc., for \$750,682. The third contract provides for the installation of two additional elevators at 168th Street station of the Broadway-Seventh Avenue subway line, which has been awarded to the Otis Elevator Company, whose bid was \$89,-805. The contract for the Fort Hamilton extension will be immediately submitted to the Board of Estimate for appropriation of the funds necessary to be provided to carry out the proposed

Trade Notes

Empire Tire & Rubber Corporation, Trenton, N. J., has been incorporated to manufacture tires and rubber products and invest in bonds in corporations operating street railways, etc. W. Holt Appar is the agent in charge.

Universal Portland Cement Company, Chicago, III., announces a substantial reduction Dec. 28 in the prices of Universal cement. The reduction is 15 cents per barrel at its Chicago plant and 10 cents per barrel at its Pittsburgh and Duluth plants.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces the transferring of E. D. Lynch, railway department, to the New Haven office. He will fill the vacancy made by J. P. Alexander's removal to the Boston office.

International Combustion Engineering Corporation, New York City, is marketing the new "Aeroil" switch-throwing outfit. This is made in several sizes, the torch burns kerosene and the whole is designed to provide the maximum of portability.

Sir W. G. Armstrong, Whitworth & Company, Ltd., and the British Thomson-Houston Company, Ltd., have entered into an arrangement whereby they will undertake jointly the complete electrification of railways and the manufacture of all types of electric locomotives and rolling stock. The first-named firm will undertake the mechanical construction and the latter the electrical part.

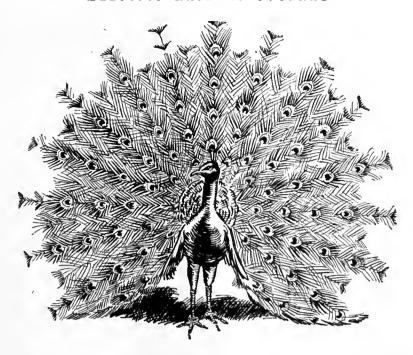
Sir Philip Nash, recently one of the directors-general in the Ministry of Transport, has been elected chairman of the Metropolitan-Vickers Electrical Company (successors to the British Westinghouse Company). At one time he was chief of the locomotive department of the Great Northern Railway and afterward chief in the same department of the East Indian Railway. During the great war he held successively the posts of director of national filling factories and director-general of transport in France.

The Burry Railway Supply Company, Chicago, Ill., which handles the Hartman center bearings, and the Perry and Peerless type side bearings, has announced the following as its territorial representatives: Nic LeGrand, Rock Island, Ill.; W. McK. White, Goshen, Ind.; P. W. Wood, New Orleans, La.; H. F. Keegan Company, New York City; H. F. McKenney Company, Portland, Oregon; William T. Campbell, Washington, D. C.; Alfred Connor, Denver, Colo.; Charles W. Wood Company, Boston, Mass.; S. A. Roberts & Company, Salt Lake City, Utah; Railway & Power Engineering Corporation, Toronto, Ont., and Winnipeg, Man.; F. F. Bodler, San Francisco, Calif., and Allison E. Thornwell, Atlanta, Ga.

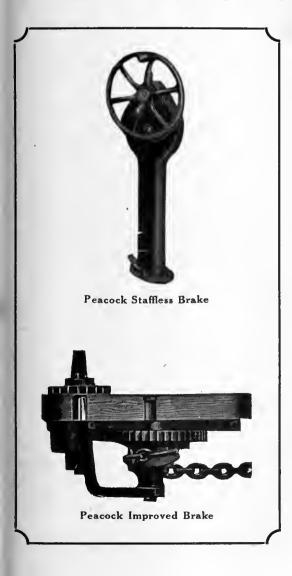
New Advertising Literature

Combustion Engineering Corporation, New York, N. Y., has issued a pamphlet which contains a condensed description of all the corporation's products. This is the first time the company has attempted to get out a general catalog containing everything it manufactures. The booklet contains sixteen pages with illustrations.

Uehling Instrument Company, Paterson, N. J., has just issued a twelve page folder which explains concisely the two biggest losses in the steam power plant. namely, (1) the loss in steam turbine economy due to air leakage into the condensing system, and (2) the sensible heat in the flue gases lost up the chimney. A table gives data on steam turbine economy as related to the absolute back pressure. Data on combustion are given in another table, such as the variation of the chimney loss with the percentage of CO, and its relation to flame temperature and ratio of air to fuel supply. The Uehling CO, recorder and indicator are illustrated and twelve different kinds of important information which these instruments furnish are cited. A list of prominent users of Uehling equipment and a list of Uehling bulletins are also appended.



PEACOCK BRAKES



Needed for New Cars in 1923

With the advent of another New Year—with plans for new cars on hand—with the problem before you of choosing the most desirable equipment for your cars—base your choice on *demonstrated* safety, efficiency and economy.

National Brake Company

Incorporated

890 Ellicott Square, Buffalo, New York

Canadian Representative: Lyman Tube & Supply Ca., Montreal, Can.

ankers and Engineers

Ford. Bacon & Davis

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Business Established 1894

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THE J. G. WHITE **ENGINEERING CORPORATION**

Engineers—Constructors

Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems

43 Exchange Place, New York

STONE & WEBSTER

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OPERATING, TRAFFIC AND RATE INVESTIGATIONS SCHEDULES—CONSTRUCTION—VALUATIONS OPERATION-MANAGEMENT

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REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

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ELECTRIC RAILWAYS

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ENGINEERS-CONSTRUCTORS ELECTRICAL-CIVIL-MECHANICAL 105 South La Saile Street CHICAGO

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Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management

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ELECTRIC RAILWAY ENGINEER

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DEPORTS-APPRAIGALS-RATES-OPERATION-SERVICE

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Specializing in Utility Rate Cases and Reports to Bankers and Investors

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Incorporated

Design and Construction of

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Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

PIQUA, OHIO

SERVICE

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The Jas. H. Crosett Co. ENGINEERS

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Planning and Equipment of City Rapid Transit Lines Special Investigations

DAY & ZIMMERMANN. Inc.

Design, Construction Reports, Valuations, Management

NEW YORK PHILADELPHIA CHICAGO

Railroad and Tram Car Specialties

New inventions developed, perfected and worked for the English market

Messrs. G. D. Peters & Co., Ltd.

Windsor Works, Slough (Bucks), Eng.

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK

Street Railway Inspection
DETECTIVES

131 State St. BOSTON

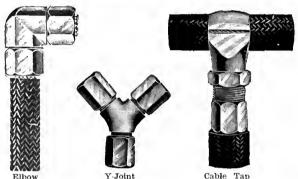
When writing the advertiser for information or prices, a mention of the Electrical Railway Journal would be appreciated.

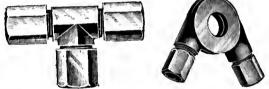
A type of DOSSERT for every service

Write for catalog giving data on each type



2-Way, Type A





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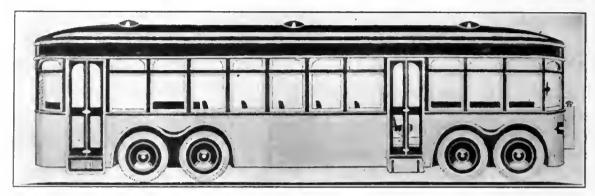
Grounding Device

DOSSERT & COMPANY

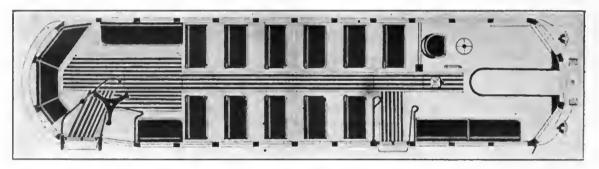
H. B. LOGAN, President 242 West 41st Street **NEW YORK**

AMECO Safety Street Car

Trackless, Trolleyless, Gasoline Drive



Ameco Safety Gasoline Street Car



Seating plan, 35 passenger capacity, (55 with standees)

THE logical answer to the motorbus. Overcomes competition by furnishing attractive, comfortable, economical and satisfactory motor-street-car service.

Hold the Transportation Field in Your Community by Filling It.

Extension, Route Development, Feeder Line, Cross-town Line and Rush Hour problems solved by the Ameco Safety Gasoline Street Car.

Westinghouse Air Brakes operating on all wheels. Doors operated by air. Standard street car type rigid trucks, front and rear, both detachable, a great servicing advantage. Flexibility of axles equal to any street or road conditions.

W-S-M engine. Dependable, powerful, economical and "lively."

Coppock Spring Suspension affords best control, easiest and most comfortable riding qualities.

Eight speeds forward, two reverse. Short turning radius.

One man operation. Rear entrance, with turnstile. Pay-as-you-exit, at front.

Takes on and discharges passengers and gets away from stops quicker than any bus or one-man electric street car.

A typical street car designed and built for organized street car interests. For use in overcoming competition from bus operators who are invading the transportation field in the community where the Street Car Company has a large capital investment and a responsible organization trained to supply all transit needs.

AMERICAN MOTORWAY EQUIPMENT CO.

Suite 617, No. 80 Wall St., New York, N. Y.



Solid Comfort on Solid Tires!

Easy riding on solid tires is only one of the many advantages HIFLEX SPRING SUSPENSION gives to

MITTEN-TRAYLOR MOTOR BUSES

A Mitten-Traylor Motor Bus hugs the ground —HIFLEX KEEPS IT THERE.

HIFLEX transforms a rough road into a smooth ride—bumps are flattened out with HIFLEX.

There is no side sway, no costly engine wrecking vibration, no driver fatigue, no danger of accidents with a Mitten-Traylor Motor Bus because of

HIFLEX SPRING SUSPENSION

Write and find out what HIFLEX really is

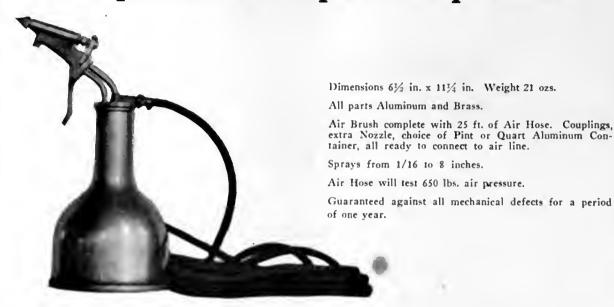
MITTEN-TRAYLOR

Philadelphia



DAYTON AIR BRUSH

New Air Paint Brush Adaptable To Open Shop Work



More than thirty electric railways are using Dayton Air Brushes for many different operations. They do the finest and most economical painting, enameling, and varnishing. They flow the material on, giving a high-grade, even appearance at a great saving of time and material. Dayton Air Brushes handle all materials from the lightest disinfectants to the heaviest leads and oils without special preparation.

Passenger Cars and all other rolling stock can be painted from the undercoating to the final finish.

Armatures, Fields, etc., may be sprayed with insulating varnishes. One Supt. of Equipment has written us that "this method of applying insulating varnishes, both air drying and baking, is much quicker than by hand, and forces the varnish or insulating compounds into the windings, insuring hetter insulation and longer life."

Bridges, Elevated Structures, Poles and all other structures may be painted with a great saving of time and material over the old hand method.

Other Uses include creosoting poles, both installed and in the storage yard, cleaning eastings and machinery, dusting motors, and many others too numerous to mention.

Dayton Air Brush Pays for Itself. It does not require a booth or specially ventilated system in which to operate. It comes ready to attach to your shop air line regardless of size or pressure. It does not require an expert operator and is self-cleaning.

Try it in your own shop

THE DAYTON AIR BRUSH CO.

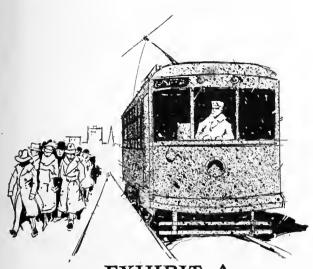
"Paints Anything

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DAYTON, OHIO, U. S. A.

Everywhere"

THE DAYTON AIR BRUSH COMPANY 17 Maryland Avenue, Dayton, Ohio





Crowd content to walk.

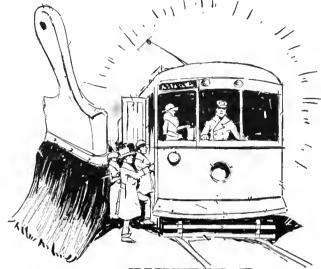


EXHIBIT B

The crowd rides.

Because the car looks attractive and comfortable.

It has been freshly painted.

Paint Sells Transportation

Most short-haul riders act on impulse. "Is there a clean comfortable looking car in One quick glance determines whether the citizen walks or rides, and it is a fact that a well groomed car invariably increases traffic. One prominent electric railway engineer says: "The cost of repainting a car is quickly offset by the increased number of riders."

Special Finishes that Sell Transportation

The Beckwith-Chandler Company has developed for your use special finishes to meet the exacting requirements of the modern electric railway painting practice. These finishes sell transportation because they provide attractive cars that stay bright.

Beckwith-Chandler Car Finishes are adaptable to any system of painting-by spray or brush.



Let us put you in touch with electric railway men who know what Beckwith-Chandler Car Finishes will do because they use them.

BECKWITH-CHANDLER COMPANY, 203 Emmett Street, Newark, N. J.



Considered as to structure, the HASKELITE roof car has many advantages. The super-strength of the HASKELITE roof means longer, better service.

The upper left-hand illustration, showing eight men on a HASKELITE safety car roof, pictures the superior serviceability of HASKELITE construction. Workmen may walk on a HASKELITE roof without fear of causing damage or leaks.

The fundamental structural properties embodied in HASKELITE car roofs are illustrated in the small test shown at the right. In service, the framework of a car receives many stresses tending to twist the car just as the hands tend to distort the small models. Observe that the model with the strip covering is distorted, but the same model with a solid cover retains its original shape.

A similar comparison exists between the slat car roof and the HASKELITE unit type of roof. More than is usually recognized, torsional stresses bring about leaks, caused by nails working through the cloth. HASKELITE roofs possess unusual capacity to resist all forces of deterioration.



Cincinnati Traction Company
Columbus Railways Company
Denver Tramways Company
Cataluna Railways, Ltd.
Millwaukee Electric Railway & Light Co.
Municipal Railways of San Francisco
Pittaburgh Railway Company
Indianapolis Street Railway Company
Twin City Lines
Illinois Traction System

Builders Using HASKELITE

American Car Company St. Louis Car Company J. G. Brill Company Cincinnati Car Company National Safety Car & Equipment Co.

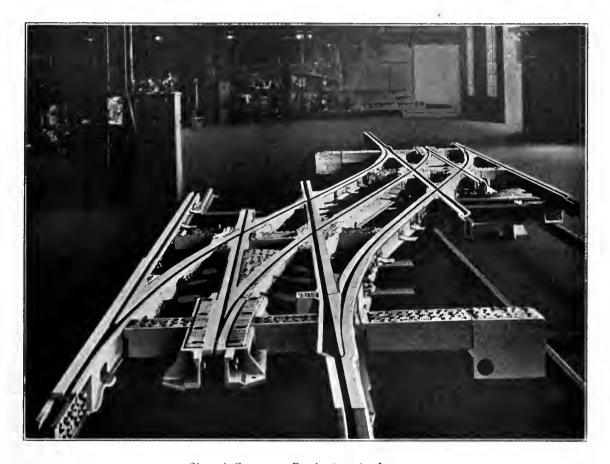
Write for our blue print booklet descriptive of the HASKELITE roof and for samples of 3 16 in. HASKELITE lining—the lightest weight head lining made today.



HASKELITE MFG. CORPORATION

133 W. Washington St., Chicago, Illinois

SPECIAL WHARTON TRACKWORK



Slotted Crossover Ready for the Inspector

All Wharton special trackwork, single pieces as well as layouts, is carefully checked and inspected at the plant.

Originators of Manganese Steel Trackwork

WM. WHARTON, JR. & CO., Inc.

EASTON, PENNA.

Other Plants:

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

PHILADELPHIA ROLL & MACHINE CO., Philadelphia

TIOGA STEEL & IRON CO., Philadelphia

Kalamazooo trolley wheels and harps

THE VERY FACT that Kalamazoo Trolley Harps and Wheels are made by the largest concern of its kind in the World is in itself an indication of their standard.

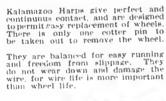
Our products are made in a shop devoted exclusively to these specialties. Today we are supplying the major part of the entire demand of the United States. There must be a reason for this, and there is. And that is, a high reputation due to high quality.

Kalamazoo Trolley Harps and Wheels have been endorsed by the leading electric roads since their inception on the market, over 25 years ago.

Kalamazoo wheels are made of virgin metal—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.











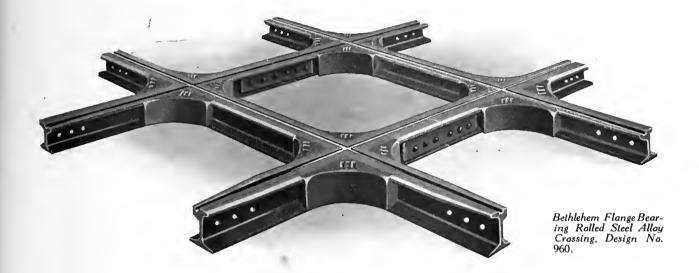
STAIR IBIRASS WORKS

Kalamazoo, Michigan

The largest exclusive manufacturers of trolley wheels in the world

BETHLEHEM

Alloy Steel Crossings



Rolled Alloy Steel—Design 960 Crossing, illustrated above, is made of a special rolled rail of Mayari chrome-nickel steel. The head of the rail is rolled full and the flangeways are machined to suit individual conditions. The rails are iron-bound, or cast welded into one solid piece and are made continuous in one track. The entire wearing surface of the crossing is of rolled alloy steel, eliminating abrupt changes in hardness between the various parts such as are found in hard center construction.

Continuous Flange Bearing—The groove or flangway is machined in the alloy steel rail head to any desired depth. These grooves are maintained at a constant level the length of the crossing and provide continuous flange bearing surfaces for the

wheels. The inclines at the ends are long and gradual and the whole arrangement assures easy riding and comparatively noiseless operation.

Weldable—There is an insistent demand for special track work that can be welded or restored after wear has developed. Design 960 Crossing can be welded or restored by either the electric arc or oxy-acetylene welding process. Welds in special work made of rolled steel are much more reliable than those in cast construction.

Mates and Frogs—The material used in the manufacture of this crossing is also used in mates and frogs, of standard construction, 7 inches or 9 inches deep. All these designs are especially recommended for heavy traffic.

BETHLEHEM STEEL COMPANY

General Offices: BETHLEHEM, PA.

Sales Offices:

New York Buffalo Boston Cleveland

Philadelphia Detroit Baltimore Chicago

Washington St. Louis

Atlanta San Francisco Pittsburgh

The Best That Money Can Buy



BUCKEYE JACKS

Fifty types and sizes for railway use

Our prices are always as low as is consistent with the use of the highest grade of material and best workmanship.

Our guarantee follows the product in every respect including lifting capacity up to the limit specified.

We confine our business and efforts to making JACKS only, and have had nearly thirty years' experience in that line.

Catalog on request.

The Buckeye Jack Mfg. Co. Alliance, Ohio

Distributors for Chicago District Crerer, Adems & Co., 239-259 East Eric St., Chicago, Ill.

Give him AIR!

Without the delay and bother of removing the whole head-gear, the welder can instantly open the window for a breath of fresh air, or for closer inspection of the work he is doing.



The Ideal Face Shield

A light but durable equipment which makes the operator more comfortable and greatly speeds up his work. Made of aluminum and vulcanized fibre. No tools required to remove glass for cleaning.

Price \$9.00—write today.

The Ideal Face Shield Company

468 N. Garfield Avenue, Columbus, Ohio

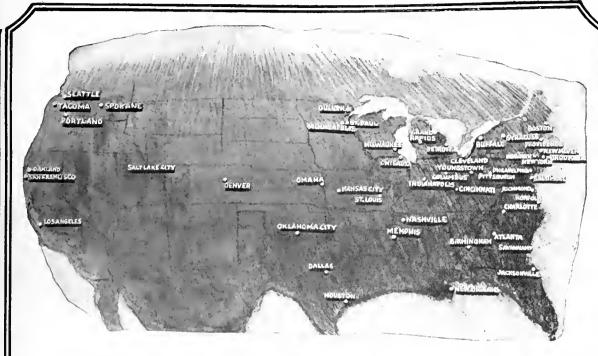


F YOU CAN'T USE IT

The equipment you do not need can usually render good service elsewhere. You can reach the largest group of buyers of such equipment at small cost through an ad in the

SEARCHLIGHT SECTION

For Every Business Want
"Think SEARCHLIGHT First"



Where Everything Electrical Is Obtainable

To the Street Railway Executive the ready accessibility of the electrical goods he needs is of paramount importance.

It is right that this should be so, for the failure of a part of the electrical installation or delay in securing replacement parts or materials can build a loss in money that grows by hours and alienates the goodwill of the travelling public.

To help the Executive bearing this responsibility and to insure against such losses is the function of Western Electric's 48 Distributing Houses.

They carry large stocks, diversified stock of standard, proven Power Apparatus, Lighting Equipment, Intercommunicating Systems and Electrical Supplies.

A House so stocked and organized is near every Street Railway.

Blanketing the great centers of Industry, Population and Transportation as these Houses do they can distribute electrical goods more economically than can the manufacturers.

Holding stocks to meet every requirement yet subject to the call of any user they can do this more economically than the users.

These economies in money pass on with the advantages of ready accessibility to users of the facilities of the House nearest them.

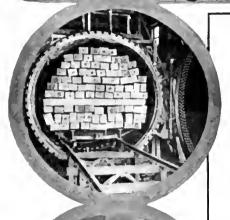
The service is complete. It is obtainable through our nearest House.

A NATIONAL ELECTRICAL SERVICE ◀

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

The International Tie



AN International Tie is a high grade, uniform tie because every phase of production is carefully supervised.

From the very start care is exercised to bring the tie out of the woods to the seasoning yard immediately in order to avoid decay.

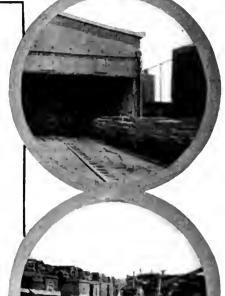
Seasoning is done over 120 acres of tile drained ground entirely free from vegetation.

Laboratory tests for moisture in ties are made before treatment. Pure creosote oil or zinc chloride is used in the preservative treatment.

Lastly and of great importance from the purchasing standpoint, International ties are graded in strict accordance with the A. R. E. A. specification and the grade plainly marked for check inspection.

This makes *every* International Tie a full sized, full faced specification tie.

Just specify the timber, the grade and the treatment desired.





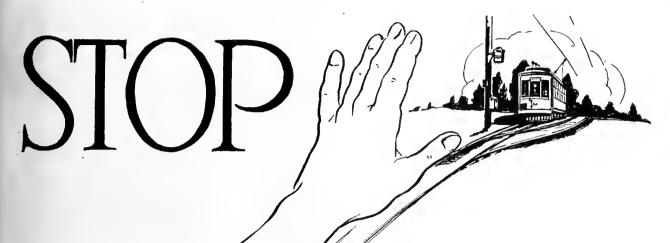
International Creosoting & Construction Co.

General Office Galveston, Tex.

Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas



Nachod Says: "Wait at this Siding"

No danger of a car running past a siding and meeting another when your line is equipped with NACHOD Automatic Signals. The "long arm of warning" reaches out and holds one at the siding while the other runs the single track.

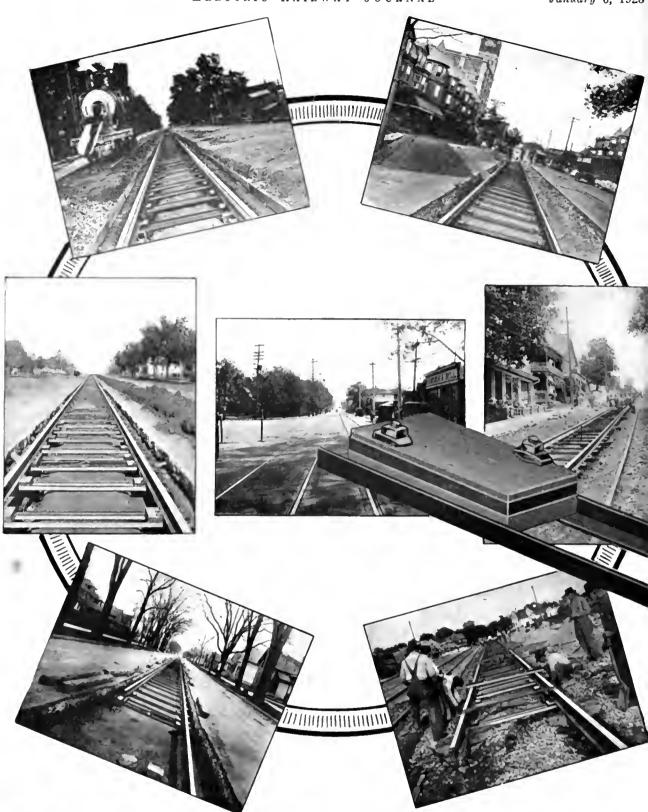
The Nachod Signal never forgets, never sleeps, never relaxes its vigilance. N-A-C-H-O-D "spells safety" to the entire system.

No other current is needed except that already in your trolley system. There is nothing about Nachod Signals to get out of order to interfere with the reliability of their service. They are easy to install and maintain. No tearing up of track or rebonding—no insulated joints. Brilliant day and night signals—separate and independent.

Over 125 electric railways in America and foreign countries use Nachod Signals. Our Catalog No. 719 gives complete information on block signals. Write for it.

We also manufacture Highway Crossing Signals and the Automatic Headway Recorder.

Nachod Signal Co., Inc. Louisville, Ky.



DAYTON

1922-A Resilient Year

That century old principle of shock absorption for dissipating the terriffic hammer blows of traffic to track has come into its own. It is the right principle for permanent track construction

Resiliency

Saves Track—Saves Equipment—Saves Money

Is it any wonder that so many railway executives—north, east, south and west—have, this past year, turned to the permanent, low cost construction made possible by Resilient ties?

It is a tribute to the conservatism of the straight thinking business men who are managing our street railways.

They have not buried their hard-earned dollars along the right-of-way for they

have found a better and more modern method of track construction at a saving in first cost of from \$2000 to \$6000 a mile. And by this same construction they have reduced their maintenance and equipment costs and have provided, for their patrons, a smooth-running, silent track. Years of service have proven that Dayton Resilient ties are built on sound principles and are fundamentally correct.

Let us send you complete details. Write today.



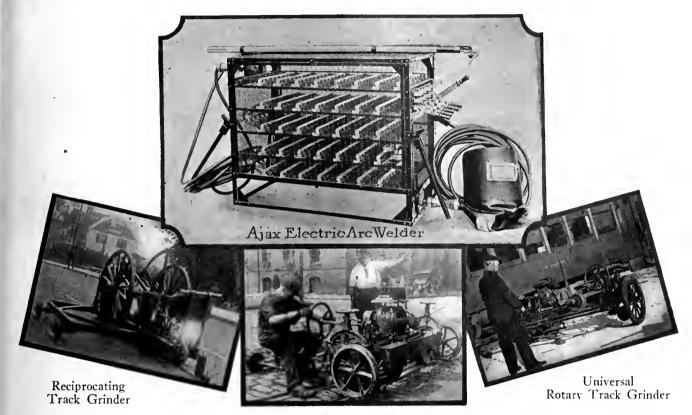
Why keep your tracks another



RAILWAY TRACK

3132-48 East Thompson St., Philadelphia, P

year unless the people ride?



Atlas Rail Grinder

Give up the railway end entirely, or make it win! The only justification for keeping car tracks in the streets is that they can carry more people, with greater speed, comfort and economy than any other form of transportation—be it private or public.

Begin now to make your tracks attract!

Old track, rough track; track with corrugated rails and track with cupped or broken joints, this largely has been responsible for making the rubber-tired vehicle more attractive. Such track has failed to justify itself—it causes slower operation, uncomfortable riding, expensive maintenance but most of all, it loses patronage.

Combat this condition by the use of modern methods of track welding and grinding. It is inexpensive, it is successful in making the rough track smooth, and it more than saves its cost by reducing wear and tear on physical equipment. Hundreds of railway companies are using our equipment for track welding bonding and grinding.

Plan now on a consistent program of improvement for 1923. Let our experts show you how you can make your service so satisfactory as to build up traffic to a more profitable basis.

WORK COMPANY

Chas, N. Wood Co., Boston Electrical Engineering on the Engineering of the Engineering Co., Pittsburgh Atlas Railway Suoply Co., Chicago Equipment & Engineering Co., London, England



Not a

New or old rails

With Thermit In



Shady Ave., Pittsburgh, between Penn Ave. and Flifth Ave., where Thermit Insert Welds, installed in old track during 1912, are still in excellent condition

Lay new track for longer life

At a cost no greater than the usual type of joint construction, you can secure an absolutely smooth, unbroken stretch of rail. No plates, no bolts, no rail bonds. Thermit Insert Rail Welds can be made during construction or after the track is laid. Once done, you can count many additional years in the life of your track.

The first cost is the last cost! Thermit Insert Rail Welds last as long as the rail, and the rail lasts longer. Paving and track sub-structure are spared that destructive pounding which comes at every ordinary joint.

Write for actual cost data, telling us approximate number of joints to be welded, and section number of rail



Metal & Thermit Corporation

Joint

made continuous



sert Rail Welds



A typical Thermit Insert Weld on Shady Ave., Pittsburgh, still in excellent condition after ten years' service

Don't repair joints—Eliminate them!

No more cupped and broken joints, no more bonds to bother with, no more unsightly holes in paving after Thermit Insert Rail Welds have been installed. The job is done for good—there's nothing more to do until the entire rail itself is worn out. Cars ride smoothly always, where Thermit Insert Rail Welds have replaced bad joints.

Let tell you how one company was saved from reconstructing an old piece of track in 1912. They eliminated the joints with Thermit Welds, and it hasn't been reconstructed yet.

Write for further details.

General Offices: 120 Broadway, New York

Pittsburgh

Chicago

Rosto

S. San Francisco

Toronto



Indianapolis Economy Products That Make Dollars "Grow"

Indianapolis Solid Manganese:

Frogs, Crossings, Mates and Tongueswitches. Super-quality material. Par-excellent designs. Gives many lives to one of ordinary construction and, when worn down, CAN BE RESTORED BY INDIAN-APOLIS WELDING.

Indianapolis Electric Welder:

Efficient, Rapid, ECONOMICAL, Durable. Price, \$2.00 (per day for three hundred days), thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

Indianapolis Welding Steel:

Fluxated heat-treated Metal Electrodes, insure Uniform, Dependable Welds that are from 75 per cent to 100 per cent more efficient than the "MELT," from the same High Grade basic stock, untreated.

Indianapolis Welding Plates:

Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOR-OUGHLY DEPENDABLE during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

Indianapolis Welding Supplies:

CABLES, HELMETS, LENSES, CARBONS.

Turntables:

Ball-bearing, for ash pits, storage yards, etc.

Indianapolis "Economy" Products

are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

The Indianapolis Switch & Frog Co.

Springfield, Ohio

Another Big Development in Rail Bonding



UNA Rail Bonds

During the past year UNA Bonds of standard capacities have become available in both laminated and cable types. For their installation a new and wonderful alloy — UNA METAL — is employed. These great developments in rail bonding represent many years of manufacturing experience combined with over two years of intense research in our laboratory.

UNA Bonds are all copper. When installed the copper bond is welded direct to the steel rails. No preliminary grinding of rails is necessary. The operator simply places the bond in a mold against the rail, applies a source of heat sufficient to melt the end of the bond and then adds sufficient UNA Metal to fill the mold. When the mold is filled the bond is finished, for the action of the UNA Metal

automatically welds the copper bond to the steel rails. The operation is very simple, readily learned and does not require previous welding experience. The speed of installation is greater than any other bonding method. It requires only about one minute to weld a 4/0 Bond to the rails and users are installing 150 to 200 bonds per day with two men.

Long life of UNA Bonds is assured, for the weld of copper to rail is very strong. Actual tests show that it requires 25,000 to 32,000 pounds to shear a bond head from the rail. Furthermore, power savings are a maximum with UNA Bonds, for the direct weld of copper bond to the rails forms a continuous path of copper from rail to rail for the current.

In addition to these excellent qualities of UNA Bonds their low cost appeals to every engineer.

Begin your 1923 Savings now with UNA Bonds. More information gladly sent upon request.

Rail Welding and Bonding Company Cleveland, Ohio



Trolley Wheels Section Switches Bushings Bearings

For Reducing Maintenance Costs in 1923

Used by many prominent electric railways because they are the rugged, long-lasting kind.

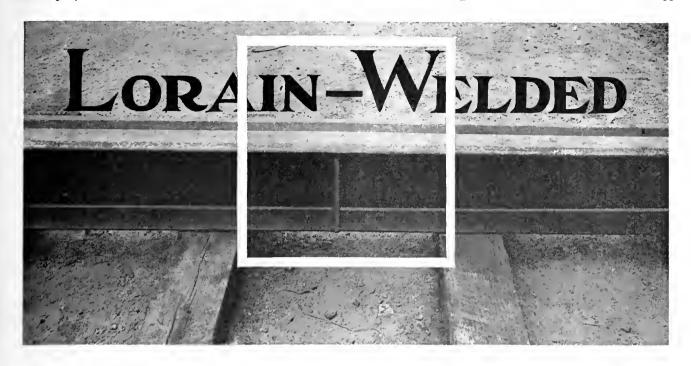
Flood City specialties were developed in the electric haulage service of Pennsylvania's coal fields. They had to be built to stand continual dampness, roughest usage, and conditions almost undreamt of in ordinary street railway service. That's why electric railways find them more economical. They endure beyond the usual limit.

For prices and full details, write-

FLOOD CITY MFG. COMPANY

Johnstown, Pa.





For a durable weld, the steel must be forged while it is hot—

Rolling Mill processes achieve this—but out on the job, on the line, it is a different matter to get the same result. However, you CAN get it by using the two

LORAIN Electric PROCESSES

BUTT WELD and BAR WELD

These are the only processes that forge the steel while the weld is being made. They give you the highest strength and conductivity through electric welding. Let us send you details about these modern methods.

The Lorain Steel Company

General Offices: Johnstown, Pennsylvania

Sales Offices:

Atlanta Chicago

Cleveland

New York

Philadelphia

Pittsburgh

Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Scattle, Portland, Los Angeles
Export Representatives: United States Steel Products Co., New York



THE STANDARD TEXTILE PRODUCTS CO.

B20 Broadway, New York Dept. E. R. J.





Your Passengers Will Appreciate

Hale & Kilburn Seats

The acknowledged standard for

City Cars

Standard

Rattan Walkover Steel Seat

Lightest Weight

Stationary Steel Seat Buses

Interurbans

Best Seats for

One-Man Safety Cars

and, in fact, every passenger service.

Write for Quotations.

HALE & KILBURN CORPORATION

American Motor Body Company, Successors

PHILADELPHIA

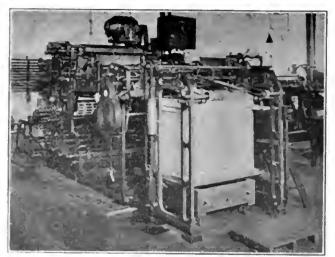
New York

Chicago

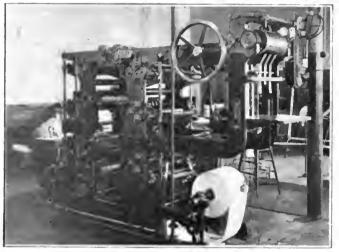
Washington

Atlanta

Los Angeles



—in Chicago



and in St. Louis

They Print Their Own Transfers On

Meisel Rotary Presses

The installations of Meisel Rotary Presses for printing the transfers of the Chicago Surface Lines and the United Railways of St. Louis, are shown in the illustrations above.

They have cut printing costs for the railway companies, besides ensuring them of a constant supply of transfers, and ability to make necessary changes in the set-up of transfers promptly at any time.

The Meisel Rotary Press is an equipment especially built for railway transfer printing—it is not a job press.

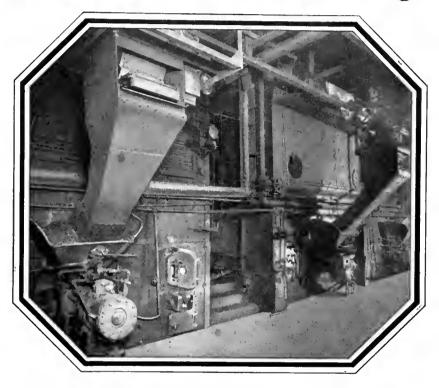
In the Chicago installation it takes a roll of paper, 31 inches wide, and gives it four complete impressions as it goes through—back, front, serial number and dating head. As it passes out of the press, it is cut into sheets of ninety-six transfers each. Operates at a normal running speed of 326 r.p.m. and will print over 200,000 per hour.

The St. Louis installation, running at normal capacity, turns out 240,000 finished transfers per hour, printed in two colors, numbered, dated and folded.

Save Money! Print Your Own!

THE MEISEL PRESS MFG. COMPANY Boston, 25 Mass.

EDGE MORUSERS Water Deboulers



The Philadelphia & West Chester Traction Co. has in service six Edge Moor Boilers totalling 2518 H. P. Three of these are here shown in the Llanerch, Pa., plant.



Whether it be in a 200,000 K. W. central station or a 300 H. P. manufacturing plant, the boiler plays a vital part in determining the margin of profit. Competition dictates strictest economy—the economy of increased efficiency—and where can its precepts be better applied than in the power plant?

Edge Moor Water Tube Boilers are designed and built to meet the conditions imposed on modern power plants.

All-steel construction; a flexible system of baffling that can be adapted to individual conditions; ability to carry fluctuating loads and high overloads for long periods without damage or loss of efficiency—these are contributing factors that make the Edge Moor Boiler a sound and profitable investment.

Construction details and performance records, together with much valuable data for the plant operator, are contained in the Edge Moor catalogue. Tell us where to send your copy.

EDGE MOOR IRON COMPANY

New York Pittsburgh Boston Established 1868 EDGE MOOR, DELAWARE Chorlotte Chicago St. Paul



A one-man car equipped with an Ohmer Fare Register with a capacity of twelve different fare classifications.

Successful Merchandising Methods

The sale of electric railway transportation is strictly a retail business proposition and should comply with those methods which have been found most successful in other lines of merchandising.

It has been proven beyond all doubt that the only safe method is to mechanically indicate and record the amount of each sale in the presence of the purchaser at the time the sale is made.

Ohmer Fare Registers indicate and record the exact amount of each fare. They apply to electric railroading the correct methods which have brought success to countless retail merchants.

Ohmer Fare Register Co.
Dayton, Ohio



Ohmer Equipment in a Side Entrance Car

BEARING METALS and CASTINGS







Ajax Bull Bearing Alloy





Thousand times better for wheels to roll freely in the service of the road than to roll frequently to the repair shop—

The trips a wheel makes in the service of the road produce income.

The trips a wheel makes to the repair shop are double liabilities because at the same time that it ceases to produce, it causes expenditure of labor, expenditure of power, depreciation of machinery.

These are self-evident truths, but it is, nevertheless, wise to harp occasionally on fundamentals that are so often disregarded.

A free rolling wheel will save, directly, axle journals and, indirectly, its wheel contour. It will also cause the equipment to run smoothly and the drawing power requirements to be kept down.

To have free rolling frictionless wheels it is essential to have perfect bearings. The AJAX Products have for many years held their supremacy in this field.

AJAX Brasses, whether ARA Standard or of other type are made of alloys of correct proportions correctly treated.

AJAX "Perfecto" Check Plates are tough, and will bend before they will break and give longest possible service.

AJAX Armature Babbitt is unsurpassed for adaptability and service.

AJAX Bull Bearing Alloy is unequalled for lining axles, and gives better results than babbitt.

THE AJAX METAL COMPANY

Established 1880

Philadelphia, Pa.

NEW YORK CHICAGO

BOSTON

CLEVELAND

WASHINGTON

Give Him a Fair Chance



Make a Good Showing

Start him off RIGHT with

BOYERIZED

"Stag Brand" Manganese Brake Heads

Bemis Trucks Case Hardened Brake Pins Case Hardened Bushings Case Hardened Nuts and Bolts Manganese Transom Plates Manganese Body Bushings Bronze Axle Bearings Brake Hangers Brake Levers Pedestal Gibs Brake Fulcrums Center Bearings Side Bearings Spring Post Bushings Spring Posts Bolster and Transom Chafing Plates

BEMIS CAR TRUCK COMPANY

Electric Railway Supplies Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
J. H. Denton, 1328 Broadway, New York City, N. Y.
W. F. McKenney, 54 First St., Portland, Oregon
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

1923-A Yea



- 1. It has 3-in, contact with wire.
- 2. Collects more current with less resistance.

Better than a trolley wheel

- 3. Keeps constant unbroken contact.
- 4. Requires less trolley tension.
- 5. Needs no oiling.

because—

- 6. Makes no noise.
- 7. Does not jump and tear down lines.
- 8. Eliminates arcing and burning of wire.
- 9. Lasts.



Miller Trolley Sho

or better things



Already many roads have found that

MILLER TROLLEY SHOES are better things

Let us prove it on your road this year

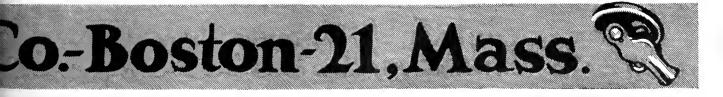
Join the constantly growing number of electric railway systems using the most economical, most satisfactory sliding contact system of current collection—Miller Trolley Shoes.

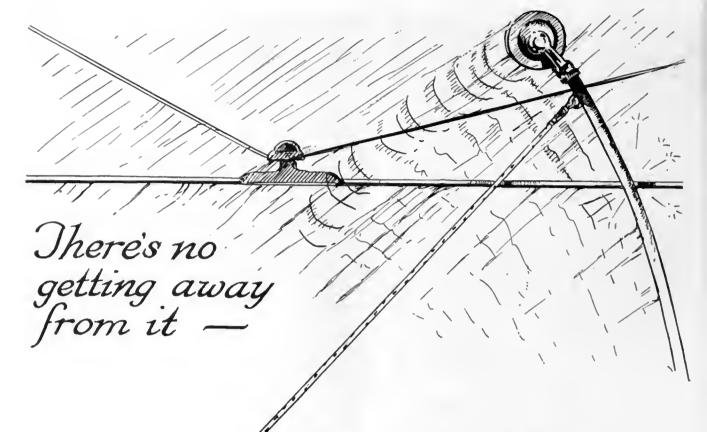
Try them! That's the way to find out if they do what we claim. Make a fair and thorough trial—equip some individual line with shocs entirely. Do not run shoes and wheels on the same wire. That's not fair to either shoes or wheels.

Wire wear is less where shoes are used exclusively because the wire takes on a smooth hard gloss. This gloss does not pit or burn because the steady contact of Miller Trolley Shoes draws no arcs. And the pressure against the wire is less—a reduction of one third is made in trolley tension when shoes are used.

The promised savings, the increased efficiency, the elimination of dewirements and broken spans—these things should be sufficient incentive to you to try the proposition. Let us show you.

Write us for trial proposition





in any kind

of weather

Samson Spot Trolley Cord

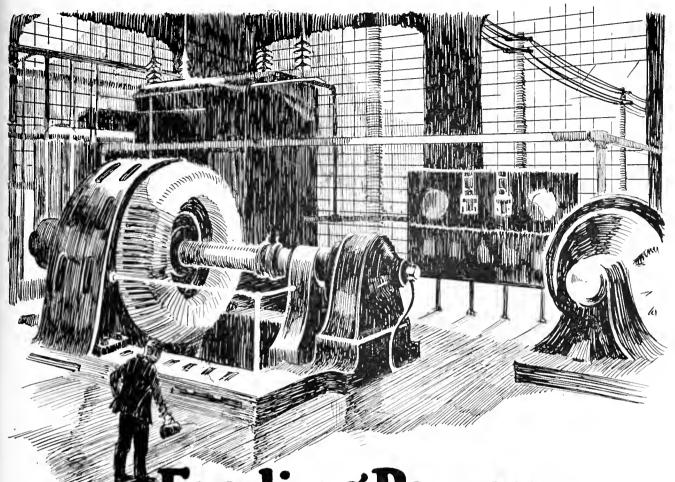
Weather means nothing to Samson Spot Cord. It is thoroughly waterproofed, smooth and hard, and is made of the same extra quality stock right clean through. It is warranted free from bad splicings and rough braiding.

But be sure it is Samson Spot Cord you are getting. It is easy to identify by the colored spots, which are our trade mark.

Samson Bell and Register Cord is the same extra quality as Samson Spot Trolley Cord. Made in drab, mahogany, and white, with wire centre if desired.

Samples, prices and full information gladly sent upon request. Write today.

Samson Cordage Works
Boston, Mass.



Feeding Power Into Friction Bearings

Of the power which you generate and transmit over your lines, with the utmost economy made possible by a scientific study of the problem, 25 to 50% is expended in overcoming journal friction in antiquated car journal friction bearings.

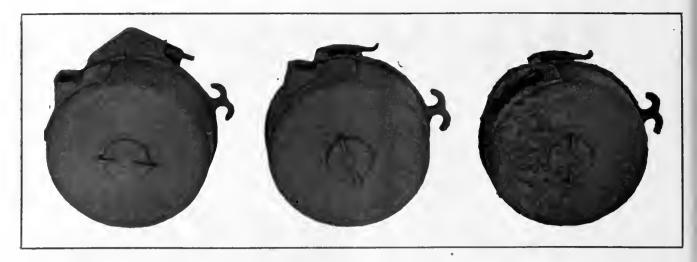
A scientific study of the car journal

bearing will quickly show the opportunity for making this economy.

Stafford Roller Bearings reduce car journal friction 90%—reduce it almost to the vanishing point. And in so doing they also eliminate car journal materials and appliances whose purchase runs into fancy figures every year.

Stafford — guaranteed three years





These four exclusive features of

EARLL

Retrievers and Catchers

are assurance of uninterrupted service

Ratchet Wind
Emergency Release
Drum Check
Free Winding Tension Spring

Dedicated entirely to the manufacture of trolley retrievers and catchers, we have developed an apparatus that has no equal. Besides, the simplicity in design that we follow produces the lightest and most rugged on the market.

Whether for safety cars, ordinary city or suburban, trolley buses or high-speed interurban cars, there is an EARLL model that meets the exact requirements.

We are willing to prove their superiority by actual tests on your own cars.

There is no need of annoying interruptions due to snapping trolleys.

C. I. EARLL, YORK, PA.

Canadian Agents:
Railway & Power Engineering Corp., Ltd.
Toronto, Ont.

In All Other Foreign Countries: International General Electric Co. Schenectady, N. Y.

WHY NOT?

TRY GILBERT'S AND TROLLEY WHEEL

The Best and Longest service possible without detriment to overhead lines—

PERFECT BALANCE AND CONTACT

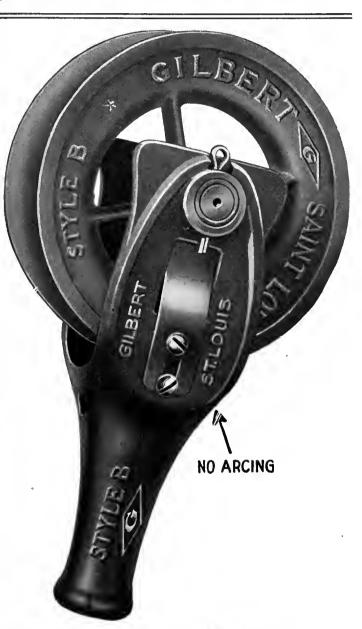
Alloy, the result of long and careful tests under all conditions.

Cut Your Maintenance Costs

With QUALITY ALWAYS

VELOX BRONZE

For Armature and Axle Bearings



Use Gilbert's "C" Grade Nickel Babbitt Metal

A.GILBERT & SONS BRASS FOUNDRY CO.

Prove to Your Own Satisfaction



The booklet "Trolley Wheels" contains a fund of vital facts on various types of More-Jones Trolley Wheels and Harps. Write today far a free copy.

Unwise purchasing of materials is a direct charge against management and means not only a direct loss of materials and labor but a larger and more vital loss due to enforced idle equipment.

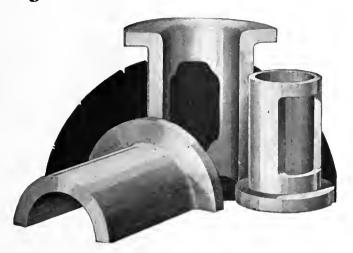
V-K NON-ARCING HARPS used with V-K OIL-LESS TROLLEY WHEELS will materially reduce operating and maintenance costs—they eliminate current loss through arcing—they have a longer life and require less attendant labor (the bushings are oil-less) than any other device on the market.

Every particle of avoidable waste and therefore loss of efficiency is eliminated when you standardize on V-K Non-Arcing Harps and V-K Oil-less Trolley Wheels.

We can prove this to your own satisfaction. We will be glad to show you the savings possible on your road.

More-cones

he Merits of More-Jones Products



Tiger Bronze Axle and Armature Bearings

are used by most Electric Railway men because they render a superior service.

Defective material in axle and armature bearings is avoidable waste and means a heavy expenditure for replacements, labor and cars out of service.

The quality of the material used in Tiger Bronze bearings insures great strength and a very slow and even rate of wear—the result, correct bearing alignment and far greater mileage.

The cost of Tiger Bronze, measured in terms of service rendered, is lower by far than any other axle and armature bearings on the market.

Let us prove this to your own satisfaction.

Armature Babbitt

There is a difference between ordinary high grade babbitt and M-J Armature Babbitt and that difference represents a considerable item of expense over a period of time.

Ordinary babbitt is not equal to the peculiar conditions of the electric railway armature bearing field such as temperature, strain, vibration and pounding.

A failure means maintenance costs and a car out of service—it's largely an avoidable waste. It isn't the loss in babbitt that counts, it's the loss in service.

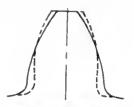
We can prove to your satisfaction that M-J Armature Babbitt represents the biggest dollar for dollar babbitt value on the market.

It has been adopted as standard by a majority of electric railways — the reason is obvious, maximum service at minimum cost.

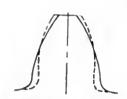
MORE-JONES BRASS & METAL CO., ST. LOUIS



Juality Products

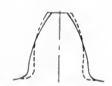


Interurban Railway Style 24 teeth, 2½ pitch, WISDOM-TOOTH contrasted with 25 teeth, 2½ pitch, standard tooth,



Elevated Raliway As Used By Interborough Rapid Transit Co.

15 teeth, 2.5948 pitch, WISDOM-TOOTH contrasted with 16 teeth, 2.5948 pitch, standard tooth.



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12 teeth, 14 pitch, WisDOM-TOOTH
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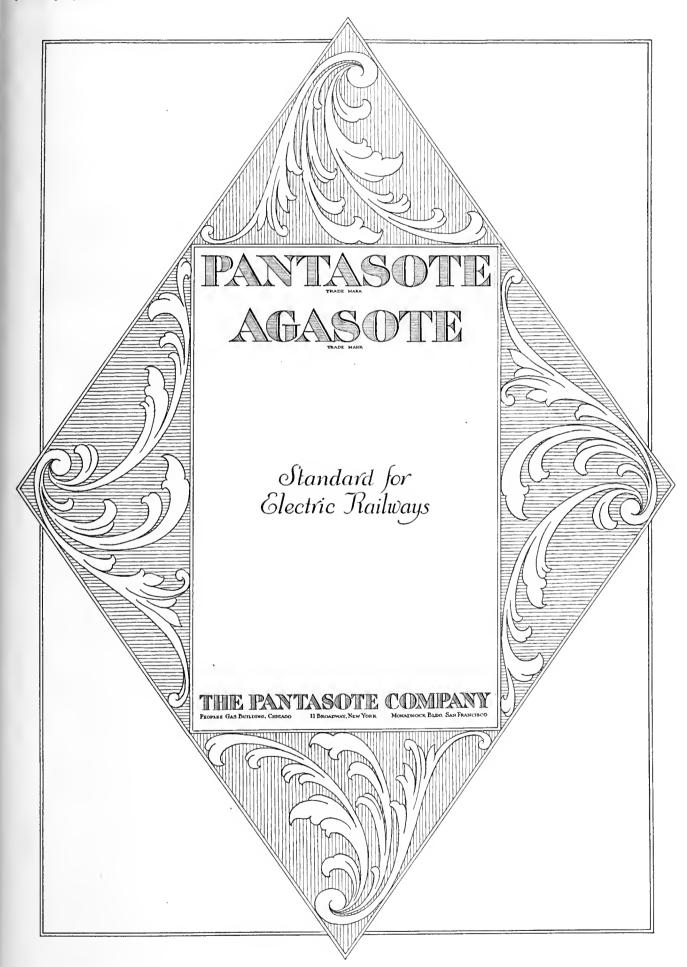
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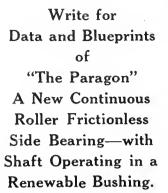




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Bulletin No. 9



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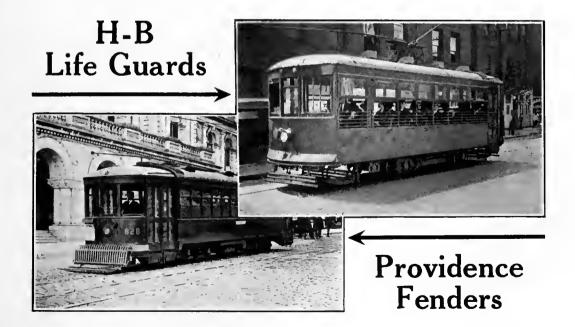
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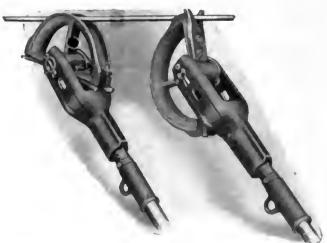
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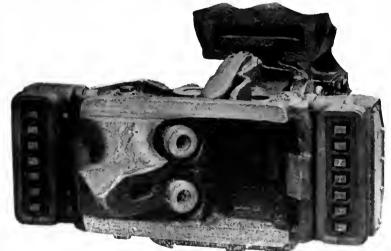


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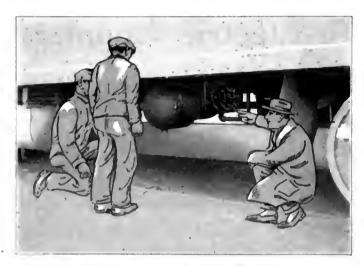
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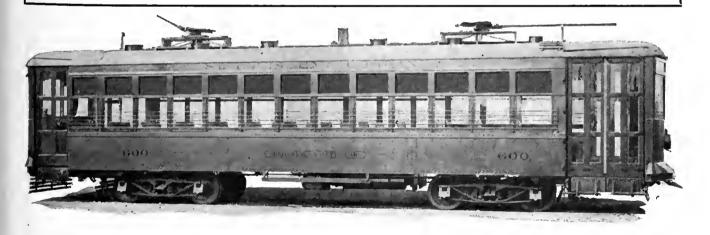
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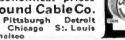
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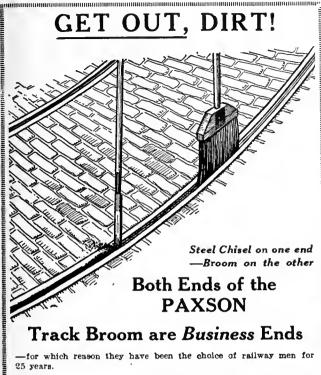
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The Buckeye Jack Mfg. Co.

Alliance, Ohio

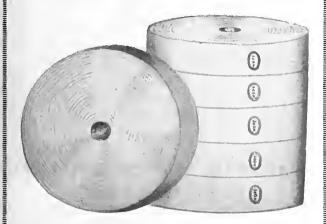
A Single Segment or a Complete Commutator

London, Eng.

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

HOPE TAPES



For results — Tapes, Webbings, Sleevings, of uniform and standard quality for electric purposes, that is, Hope Webbing Company service.

Send for samples and prices

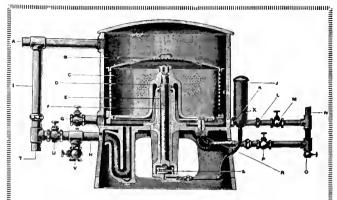
HOPE WEBBING CO.

Providence

New York

rk Troy (

Chicago



Extracting Dollars from Oily Waste \$ \$ \$ \$ \$ \$ \$ \$ \$

Reclaim your oil and cotton engine room wiping waste!

You can do it too. Here is a clean saving of hundreds of dollars within your grasp. Oil reclaimed this way is pure and good, absolutely suitable to be used over and over. The cost of the machine is small and its operation and maintenance are inexpensive, let us demonstrate it to you. It will pay you to investigate.

Write for full details

Oil & Waste Saving Machine Co. Philadelphia, Pa.

Car Seat and Snow Sweeper Rattan

For 60 years we have been the largest importers of rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

SALES OFFICES:

Heywood-Wakefield Co.

Heywood-Wakefield Co.

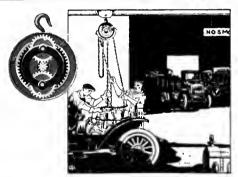
Heywood-Wakefield Co.

Heywood-Wakefield Co.

1415 Michigan Ave., Chicago
E. F. Boyle, Monadnock Bldg., San Francisco, Cal,
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.

Railway and Power Engineering Corp., Toronto and Montreal
G. F. Cotter Supply Co., Houston, Texas

FORD TRIBLOC



For Accurate Placing

THE Tribloc lowers its load gently and accurately into place. To understand why, one has only to examine the planetary gear system. Such a well balanced drive insures absolute smoothness of operation. A Tribloc will never jump, jam, or jerk under its proper load.

Write for information on any type or capacity to 40 tons. 2217-D

FORD CHAIN BLOCK CO.

OVER-SEAS REPRESENTATIVE

ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA

PARIS TRUSSELS TURIN BARCELONA RIO DE JANEINO



Type R-10 International Single Register. This register, hand or fool operated, is also arranged for electric operation and the double Type R-11 is arranged for electric operation only.

Type R-10

More Revenue?

A more important matter than extensions and additions to service is the securing of maximum revenue from existing facilities.

A great majority of street railway systems find that the accurate, dependable registration of Internationals helps in securing this maximum revenue.

Their simplicity of operation and the definite visible and audible registration of each fare helps platform men, and gives a record which the accounting department can rely upon.

Our mature experience in fare collection and accounting matters is at the service of street railway organizations for the asking.

The International Register Co.

15 South Throop St., Chicago Exclusive Seiling Agents for HEEREN Enamel Badges

TRACTION MOTORS

DESERVE THE BEST

Let Us Prove That



RAILWAY MOTOR BRUSHES ARE THE BEST

BECAUSE

They are SELF-LUBRICATING, NON-ABRASIVE and of UNIFORM QUALITY.

Their CARRYING CAPACITY is HIGH and their COEFFICIENT OF FRICTION LOW.

There is a specially designed grade for every purpose—RAILWAY MOTORS, AIR COMPRES-SORS or POWERHOUSE EQUIPMENT.

Write for CATALOG B-3

The United States Graphite Company Saginaw, Michigan, U. S. A.

District Offices:
Pittsburgh Chicago Denver St. Louis San Francisco New York Philadelphia

THE COAL ** IRON NATIONAL BANK of the City of New York

Capital \$1,500,000

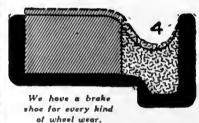
Surplus \$1,000,000

Und. Profits \$363,051

Resources \$23,743,000

Offers to dealers every facility of a New York Clearing House Bank.

Avoid Costly Car Lay-Ups



Avoid Costly Car Lay-ups and eliminate the expense of wheel re-moval by installing wheel truing Brake Shoes on all of your cars.

They work while your ear miles pile up.

When flange onty needs correction use type of brake shoe (section only) shown in cut.

Wheel Truing Brake Shoe Company Detroit, Michigan

width, with or without noning

Y SAFETY TREAD for car and station steps Standard for 18 years

American Mason Safety Trend Co., Lowell, Mass.
Stanwood Steps and Karbelith Flooring
Branch ethora is New York and Philadelphia
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STE OUR SWEET'S Fare Boxes

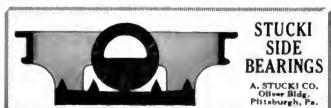
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COIN COUNTERS SORTERS

WRAPPERS

THE CLEVELAND FARE BOX CO.

CLEVELAND, OHIO Canadian Branch, Preston, Ontario.

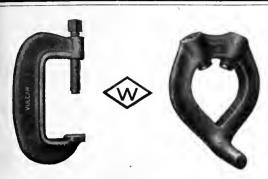


\$5 New Users in the Last 4 Months

KASS SAFETY TREADS present an Unusual Combination

in that they give BETTER RESULTS AT LESS COST Manufactured and Sold by

Morton Manufacturing Company, Chicago



Strength and Service

Use the dependable, sturdy strength of Williams' Drop-Forged Clamps and Lathe Dogs-they'll never fail you and will last a life-time.

Clamps-11 patterns, in a wide range of sizes for every purpose.

Safety Lathe Dogs, bent or straight tail, 1 or 2 screws, 16 sizes.

Ask your dealer-Literature on request.

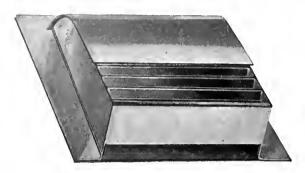
J. H. WILLIAMS & CO.

"The Drop-Forging People"

BUFFALO 143 Vulcao St.

VENTILATORS

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THE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

> More than seven thousand N-L Ventilators sold during 1922.

The Nichols-Lintern Company 7960 Lorain Ave., Cleveland, O.

N-L Products manufoctured and sold in Canada by Railway and Power Engineering Corporation, Ltd., 133 Eastern Avenue, Toronto, Ontario

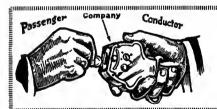
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Address All Communi-cations to BUSH 220 36th St.)

Literature on

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Direct Automatic Registration By the Passengers

Rooke Automatic Register Co. Providence, R. I.

75% of the electric railways BONNEY-VEHSLAGE TOOL CO., Newark, N.J.



Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company 1725 Mt. Elliott Ave., Detroit, Mich.

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Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO. Brooklyn, N. Y.

AMERICAN means QUALITY RATTAN SUPPLIES OF EVERY DESCRIPTION



TWO, FOUR AND FIVE ARM TURNSTILES

Send for Circulars DAMON-CHAPMAN CO. Rochester, N. Y.

You're having brush froutle

USE LE CARBONE CARBON BRUSHES

They talk for themselves.

COST MORE PER BRUSH COST LESS PER CAR MILE

W. J. Jeandron 345 Madison Avenue, New York . Pittsburgh Office: 634 Wabash Bldg.

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Brake Shoes A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type



Standard Patterns

for

SAFETY CAR

D-67 for Narrow Treads D-87 for Wide Treads



American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

THE WORLD'S STANDARD

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"IRVINGTON"

Black and Yellow Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
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Sales Representatives in the Principal Cities

We Specialize in Electric Railway Lubrication

Tule, a lubricant, gives many advantages, in operation and reduces the cost of lubrication. Our service men are engineers, and besides advising proper methods, will pack your cars, show you how and why Tule should he used, and get money-saving results. Ask us for details.



The Universal Lubricating Co. Cleveland, Ohio

Scientifically and accurately compounded to reduce lubricating costs.



The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week



Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS

t'se them in your Prepayment Areas and Street Cars

Percy Manufacturing Co., Inc. 30 Church Street, New York City



See the Grank of the

GREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

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Positions Vocont and all other classifications,
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Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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An odvertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

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POSITIONS VACANT

A NIGHT barn foreman wanted for a suburban line in the East; must understand safety car operation and repairs. Give experience and salary desired. P-498, Elec, Railway Journal, 10th Ave. at 36th St., New York City.

DRAFTSMAN wanted; familiar with steam and street railway special track work. State salary, experience, etc. P-495, Elec. Ry. Journal, Old Colony Bldg., Chicago, III.

ENGINEER wanted, familiar with street railway special track work, to work into sales organization. Give full details in first letter. P-494, Elec. Ry. Journal, Old Colony Bldg., Chlcago, Ill.

SUPERINTENDENT wanted for Street Railway Company in a town of 25,000 people in the Southwest, operating 12 cars. None but high grade men of experience need apply. P-497, Electric Railway Journal, Old Colony Bldg. Chicago, Ill.

POSITIONS WANTED

SUPERINTENDENT motive power and equipment, with good record based on broad experience, city and interurban, A.C. and D.C., desires position. PW-491, Elec. Ry, Journal, Old Colony Bldg., Chicago, Ill.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad and also local address of office to which reply is sent.

> 10th Ave, at 36th St., New York. 509 Real Estate Trust Bldg., Phila. 533 Leader-News Bldg., Cleveland. 1570 Old Colony Bldg., Chicago. 531 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents — send couples.

0195

FOR SALE

20-Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors, K.12-H Control, West. Air Taylor Trucks, R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.

Commonwealth Bldg., Philadelphia. Pa.

FOR SALE

26—GE—216 MOTORS

TRANSIT EQUIPMENT COMPANY 501 Fifth Avenue, New York

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"The House of Dependable Service"

NEW and RELAYING

RAILS

of all Sections

HYMAN-MICHAELS CO.

Peoples Gas Building, Chicago, Ill.

Branch Offices: 1324 Woolworth Bldg., New York 2115 Railway Exchange Bldg., St. Louis 1313 First Nat'l Bank Bldg., Pittsburgh

Write or wire when in the market to BUY or SELL

Please Mention this Publication

The "Searchlight" Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are you using the Searchlight Section?

0318

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Cae Colher, Inc., Barron G. Air tircuit Itreakers Boller-Smith Co Air Receivers, Aftercoolers Ingersoll-Rand Co. Ammeters Roller-Smith Co. Roller-Smith Co.
Aochors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch
Stand Stand Ramapo Ajax Corp. Automatle Safety Automatic Stafety Switch Stands
Ramapo Ajax Corp.
Axie Straighteners
Columbia M. W. & M. I. Co.
Axies, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Supplies Co.
International Register Co.
The Standa The
Bankers and Brokers
Coal & Iron National Bank
Batteries, Dry
National Carbon Co.
Nichola-Lintern Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gibert & Sons B. F. Co.
Le Grand, Inc., Nic.
More-Jones Br. & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Bolice
Blood Bealings, Carbon Co.
Butter Bellings Supplied Co. Bearings, Center and Roller
Side
Burry Railway Supply Co.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car
Truck Co.
Beils and Gongs
Brill Co., The J. G.
Columbia M. W. & M. J. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Western Electric Co.
Benders, Rail
Ry. Track-work Co.
Watson-Stillman Co.
Hollers Watson-Stillman Co.
Rioliers.
Edge Moor Iron Co.
Boiler Tubes
Edge Moor Iron Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Rall Welding & Bonding Co.
Roller-Smith Co.
Bonding Amparatas Roller-Smith Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Supiles Co.
Indianapolis Switch & Frog tomanapous switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Western Electric Cn.
Bonds, Rail
Amer. Sieel & Wire Co.
Elec. Railway Imp. Co.
Elec. Railway Imp. Co.
Elec. Railway Imp. Co.
General Electric Co.
Ohio Brass Co.
Railway Track Work Co.
Railway Track Work Co.
Railwey Track Work Co.
Western Electric Co.
Western Electric Co.
Western Electric Co.
Brass. Switch Western Electric Co.
Western Electric & M. Co.
Boxes, Switch
Johns-Fratt Co.
Braces and Cross Arms
(Rec also Poles, Ties, Poets,
etc.)
Bates Exp Steel Truss Co.
Creaghead Eng Co.
Elec, Ry Equip, Co.
Elec, Ry Equip, Co.
Bloc, Service Supplies Co.
Hubbard & Co.
Ghio Brass Co.
Western Electric Co.
Brake Adjustees
Nat'l Ry. Appliance Co.
Western Electric Co.
Brake Shees
Amer Brake Shoe & Fdry.
Co.
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Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
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Hattan
Amer. Rattan & Reed Mfg.
Co. Roller-Smith Co.
Westinghouse Elec. & M. Co.
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Wires and Cables
Anderson Mig. Co., A. &
J. M.
Dosecri & Co.
Electric Railway Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.
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(See also Snow-Flows,
Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
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(See Conveying and Holstling Machlnery)
Coll Banding and Winding
Machlnes
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Colls, Armature and Field
Columbia M. W. M. I. Co. Co. Paxson Co., J. W. Passon Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
Westinghouse Elec. & M. Co. Brushes, Graphite
National Carbon Co.
U. S. Graphite Co. National Carbon Co. U. S. Graphite Co. Brush Holders Anderson Mig. Co., A. & J. M. Columbia M. W. & M. I. Co. Colls, Armature and Field Columbia M. W. & M. I. Co. General Electric Co. Rome Wire Co. Westinghouse Elec. & M. Co. Brushes, Wire Pneumatic Ingersoll-Rand Co. Buses, Motor American Motorway Equip. Colls, Choke and Kicking Electric Service Supplies Co. General Electric Co. Westinghouse Elec. & M. Co. Coin-Counting Machines International Register Co. Co. Brill Co., The J. G. Mitten-Traylor, Inc St. Louis Car Co. Mitten-Traylor, Inc.
St. Louis Car Co.
Rushings
Nat'l Fibre & Insulation Co.
Rushings, Case Hardened and
Manganese
Bemile Car Truck Co.
Brill Co., The J. G.
Bras Seats
Hale & Kitburn Corp.
(Tables
(Nee Wires and Cables)
Tambric Tapes, Yellow &
Black Varnish
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Rushes
(See Brushes, Carbon)
Car Lighting Apparatus
Elec. Service Supplies
Car Faoel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
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Differential Steel Car Co. The Johnson Fare Box Co. Commutator Slotters Electric Service Supplies Co. General Electric Co. Westinghouse Elec. & M. Co. Commutator Truing Devices General Electric Co. Commutators or Paris Cameron Elec'il Mfg. Co. Columbia M. W. & M. I. Co. General Electric Co. Westinghouse Elec. & M. Co. Commutators or Mfg. Co. General Electric Co. General Electric Co. Westinghouse Elec. & M. Co. Compressors, Air Allis-Chalmers Mfg. Co. General Electric Co. Ingersoll-Rand Co. Westinghouse Tr. Br. Co. Compressors, Air Portable Ingersoll-Rand Co. Compressors, Gas Ingersoll-Rand Co. Condensers General Electric Co. Johnson Fare Box Co. f'ars, Bamp Differential Steel Car Co., Cars. Hamp
Differential Steel Car Co.,
Inc.
(ars. Gas Rai)
St. Louis Car Co
tars. Passeogre Feelght
Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., Q. C.
McGuire Cummings Mfg.
Co.
National Ry Appliance Co.
St. Louis Car Co
Thomas Car Works,
Perley A.
Wason Mfg. Co.
Witt. Peter
Cars. Second Hand
Electric Equipment Co.
tars. Second Hand
Geoeral Electric Co.
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or Coppes
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J. M.
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Wharton, Jr., & Co., Inc.,
Wm
fastings, Gray Iron and Steel
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Edwards Co., Inc., The O.M.
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Electric Service Supplies Co.
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Dryers, Rand
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E. P.
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Day & Zimoterman, Inc.
Dodd, J. N.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Jac R
Parsons, Klapp, Brinkerhoff
& Donglas
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Smith & Co., C. E.
Stone & Webster
Witt, Peter
Engines, Gas, Gil and Steam
Ingersoil-Rand Co.
Westinghouse Elec. & M.
Co.
Typansion Joints, Tesek Westinghouse Biec. & M. Co.
Preparation Joints, Teack
Wharton Jr., & Co., Inc., Wm.
Extension Platform Tesp
Boors
Edwards Co., Inc., The O.M.
Fare Shields
Ideal Face Shield Co., The
Fare Rayes
Cleveland Fare Box Co.

Economy Elec, Devices Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.
Fences, Woven Wire and
Yence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Gnards
Brill Co. The, J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Sup. Co.
Le Grand, Ive. Nic
Star Brass Torks
Fibre and Pibre Tubing
Nat'l Fibre & Insulation Co.
Westinghouse E. & M. Co,
Field Colla. (See Colls)
Flatilmum Insulation Westinghouse E. & M. Co.
Fleid Colla. (See Colls)
Flatilium Insulation
Nat'y Ry. Appliance Co.
Floodlights
Electric Service Sup. Co.
Flooring, Composition
American Mason Safety
Tread Co. American Mason Safety
Tread Co.
Tread Co.
Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Williams & Co. J. H.
Froga & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track. (See Track
Work)
Frogs, Trolley
Ohio Brass Co.
Furniture, Metal Office
Edwards Co., Inc., The O.M.
Fuses and Fuse Boyes
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
General Electric Co.
Western Electric Co.
Western Electric Co.
Western Electric Co.
Williams & Co., J. H.
Fuses, Cartridge, Non-Refilable
Johns-Pratt Co.
Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Pratt Co.
Gaskets
Power Specialty Co. Johns-Pratt Co.
Gaskets
Power Specialty Co.
Westingbouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co. General Electric Co.

Cas Producers
Westinghouse Elec. & M. Co.

Casolene Torches
Economy Elec. Devices Co.

Cates, Car
Brill Co., The, J. G.

tiear Rhanks
Carnegie Steel Co.

Standard Steel Works Co. Standard Steel Works Co.
Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Weetinghouse Elec. & M. Co.
Gears and Pinions
Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Bervice Supplies Co.
General Electric Co.
Nat'l By. Appliance Co.
Nat'l By. Appliance Co.
Natlall Co., R. D.
Tool Steel Gear & Pinion
Co. Nutail Co., R. D.
Tool Steel Gear & Pinion
Co.
Generating Sets, Gas-Electria
General Electric Co.
General Electric Co.
General Electric Co.
Western Electric Co.
Western Electric Co.
Western Electric Co.
Western Electric Co.
Toologies, Safety
Indianapolis Switch & Frog
Co.
Co.
Co.
Gongs (See Bells and Gongs)
Graphite
Morganite Brush Co.
Greases, Gee Lubricanta
Grinders and Grinding Supplies plies Indianapolis Switch & Frog Indianapolis Switch & Fro Co. Metal & Thermit Corp. Railway Track.work Co. Grinders. Fortable. Railway Track Work Co. Grinders. Fortable Electric Railway Track Work Co. Segmout Bail Grinder Co E. P. Grinding Blocks and Wheels Railway Track-work Co. Seymour Rail Grinder Co., E. P. E. P.
Gnard Rail Clamps
Ramapo Ajax Corp.
Gnard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.



A Four-Tool I-R Tamping Outfit

Saving on Reconstruction Work

"Imperial" Pneumatic Tie Tampers reduce schedule disarrangement and loss of revenue by saving time in track or crossover replacement.

The labor-saving possible with "Imperial" Tampers is another factor of equal importance. A five or six-man gang does as much work as fifteen to twenty men with ordinary picks and bars. Around frogs, switches and crossovers, where hand picks and bars are at a disadvantage, "Imperial" Tampers are just as effective as on straight track.

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Ask for actual data on this work and see for yourself the savings made by companies using Pneumatic Tamping Methods.

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Bayonet Trolley Harp Co.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Hieadling Headining
maskehte Mig. Co
Pantasote Co., The
Heaters, Car (Electric Consolidated Car strie)
- Heating Co. Economy Electric Devices Co. Gold Car Heating & Light-Nat'l Ry. Appliance Co. Smith Heater Co., Peter Heaters, Car, Hot Air and Water Water Electric Service Sup. Co. Smith Heater Co., Peter lilmets, Weiding Indianapolls Switch & Frog Co. Railway Track-Work Co. Hailway Track-Work Co.
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Columbia M. W. & M. I. Co.
Ford Chain-Block Co.
Hoists, Portable
Ingersoll-Rand Co.
Hose, Bridge
Ohio Brass Co. Omo Brass Co.

Hydraulic Machinery
Watson-Stillman Co.
Instruments, Measuring, Testing and Recording
Economy Electric Devices
Do.

Do.

Blanch Co. Do.
Electric Service Sup. Co.
General Electric Co.
Roller-Smith Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
Insulating Cloth, Paper and
Tame naulating Cloth, Faper and Tape
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
National Fibre & Insulation
Co.
Westinghouse Tr. Br. Co. Westinghouse Tr. Br. Co. Insulating Machinery Co. Insulating Silk Irvington Varnish & Inc. Co. Insulating Silk Irvington Varnish & Inc. Co. Insulation. (See also Paints) Anderson M. Co., A. & J. M. Electric Ry. Equipment Co. Electric Service Sup. Co. General Electric Co. Irvington Varnish & Ins. Co. Westinghouse Elec. & M. Co. Westinghouse Elec. & M. Co. Insulaters. (See also Line Material) Anderson M. Co., A. & J. M. Material)
Anderson M. Co., A. & J. M.
Creaghead Engineering Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.

Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
Insulator Pins
Electric Service Sop. Co.
Insulation Slot
Irvington Varnish & Ine. Co.
Insulating Varnishes
Irvington Varnish & Ine.
Inc. Co.
Insulating Varnish & Ine.
Insula

Journal Boxes
Bemis Car Truck Co.
Birll Co., The, J. G.
Lahor Adjusters
Corporation Service Bureau,
The The Lamp Guards and Fixtures Anderson M. Co., A & J. M. Electric Service Sup. Co. General Electric Co. Westinghouse Elec. & M. Co.

westingnouse Elec. & M. Co. Lamps, Are and Incandescent (See also Headlights) Anderson M. Co., A. & J. M. General Electric Co. Nat'l Elec. Specialty Co. Westinghnuse Elec. & M. Co. Lamps, Signal and Marker Nichols-Lintern. Co. Lanterna. Classification. Nichola-Lintern Co.
Latte Attachments
Williams & Co. J. H.

Leather Cloth Standard Te tile Products Corp.
Lightoing Protection
Anderson M. Co., A. & J. M.,
Electric Service Sup. Co.,
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Line Material. (See also
Brackets, Insulators, Wires,

Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Creakhead Mfg. Co.
Dossert & Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
English Electric Co.
General Electric Co.
Hubbard & Co.
More-Jones Br. & Metal Co.
Western Electric Co.
Western Electric Co.
Western Electric Co.
Western Electric Co.
Western Spriog Boxes

Westinghouse Elec. & M. Co. Locking Spriog Boxes Wharton, Jr. & Co., Inc. Wm. Locomotives, Electric General Electric Co. McGuire Cummings Mfg. Co. Westinghouse Elec. & M. Co. Westinghouse Elec. & M. Co. Lubricating Engineers
Galena-Signal Oil Co. Universal Lubricating Co. Vacuum Oil Co.
Lubricants, Oil and Crease
Borne. Scrymser Co.
Galena-Signal Oil Co.
Universal Lubricating Co.
Vacuum Gil Co.
Lumber. (See Poles, Tles, etc.)

Lumber. (See Poles, Tles, etc.)
Machine Tools
Columbia M. W. & M. I. Co.
Watson-Stillman Co.
Manganese Steel Guard Rails
Ramapo Ajax Corp.
Manganese Steel, Special
Track Work
Indianapolis Switch & Frog Co. Wharton, Jr. & Co., Inc., Wm.

Wm.
Manganese Steel Switches,
Frogs and Crossings
Ramapo Ajax Corp.
Meters, Car Watt-Hoor
Economy Elec. Devices Co.

Meters, Car Watt-Hour
Economy Elec. Devices Co.
Mica
Mica Insulator Co.
Motor Buses
(See Buses, Motor)
Motor Leads
Dossert & Co.
Motormen's Seate
Brill Co., The, J. G.
Electric Service Sup. Co.
Wood Co., Chas. N.
Motors, Electric
General Electric Co.
Westinghouse Elec. & M. Co.
Motor and Generator Sets
General Electric Co.
Nute and Boite
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Ummeters

Huddard & Co.
Ohnmeders
Roller-Smith Co.
Olls (See Lubricants
Packing
Electric Service Sup. Co.
Power Specialty Co.
Westinghouse Tr. Br. Co. Paint tiuns
Dayton Air Brush Co.
Paints and Varnishes, lating eekwith-Chandler Co

lating
exewith-Chandler Co.
Painta and Varnishes for
Woodwork
Arkley Brake & Sup. Co.
exewith-Chandler Co.
Painta Suraying Device
Dayton Air Brush Co.
Paving Material
Amer. Br. Shoe & Fdry Co.
Paving Material
Amer. Br. Shoe & Fdry Co.
Pickopa, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.
Pinlon Pullera
Columbia M. W. & M. J. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas N.
Pinlons, (See Gears)
Pins, Case Hardened, Wood
and Irm
Benis Car Truck Co.
Electric Service Sup. Co.
Ohio Brass Co.
Wood France Co.
Electric Service Sup. Co.
Ohio Brass Co.
Wood France Co.
Electric Service Sup. Co.
Ohio Brass Co.
Westinchouse Tr Br. Co.
Pipe Fittings
Power Speciality Co.

Ohlo Brasa Co
Westinshouse Tr Br. Co.
Pipe Fittings
Flower Specialty Co.
Standard Steel Works Co.
Walson-Stillman Co.
Westinghouse Tr. Br. Co.
Planers. (See Machine Tools)
Plates for Tre Roll Switches
Ramapo Alax Corp
Pilers, Rubber Insulated
Electric Service Sup Co.
Pneumatic Tools &
Accessories Accessories Ingersoll Rand Co

Pule Line Hardware Ohio Brass Co. Pole Relatoreing Drew Elec. & Mfg. Co. Hubbard & Co. Poles, Metal Street Bates Expanded Steel Truss

Bates Expanded Steel Truss
Co.
Electric Ry. Equip. Co.
Hubbard & Co.
West-rin Electric Co.
Poles and Ties, Treated
International Creosoting &
Construction Co.
Poles, Ties, Posts, Piling and
Lumber
International Creosoting &
Construction Co.
Le Grand, Inc. Nic
Nashville Tie Co.
Sould, Cypress Mirs, Assn.
Poles, Troller
Anderson Mig. Co., A. &
J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Nuttail Co., R. D.
Poles, Tahular Steel
Elec. Ry. Equip. Co.
Electric Service Sup. Co.
Power Saving Devices
Co.
Nat'l Ry. Appliance Co.

Economy Electric Devices
Co.
Nat'l Ry. Appliance Co.
Presses, Trainsfer
Meisel Press Mfg. Co.
Pressure Regulaturs
General Electric Co.
Westinghouse Elec. & Mfg.
Co.
Promps

Westub
Co.
Co.
Pumps
Ingersoil-Rand Co.
Watson-Stillman Co.
Pumps, Vaenum
Ingersoil-Rand Co.
Punches, Ticket
Bonney-Vehslage Tool Co.
International Register Co.,
The
Wood Co., Chas. N.
Punching Machinery
Watson-Stillman Co.
Rail Braces & Fastenings
Ramapo Ajax Corp.
Co.

Rail Bracea & Fastenings Ramapo Ajax Corp. Rall Joints Carnegie Steel Co. Rail Joints, Welded Indianapolie Switch & Frog

Co. Rail Grinders. (See Grinders) Rail Oinders. (See Uraugus).
Rails, Steel
Bethlehem Steel Co.
Carnegle Steel Co.
Railway Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
Rail Wriding. (See Welding
Processes)

Processes)
Metal & Thermit Corp.
Ry. Track-work Co.
Rail Welding & Bonding Co. Rattan Amer. Rattan & Reed Mig.

Co.
Ilrill Co., The J. G.
Electric Service Sup. Co.
McGuire Cummings Mig. Co.
St. Louis Car Co.
Reclaimers, Waste & Oll
C & Waste Saving Machine

Reclaimera, Waste & Gil
Oil & Waste Saving Machine
Cn.
Registers and Fittings
Brill Co., The, J. G.
Electric Service Sup. Co.
International Reg. Co., The
Ohmer Fare Register Co.
Rooke Automatic Reg. Co.
St. Louis Car Co.
Reinforcement, Concrete
Amer. Steel & Wire Co.
Carnegie Steel Co.
Repair Shop Appliances. (See
also Coll Banding and
Winding Machines)
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Repair Work. (See also
Collis)
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghnuse Elec. & M. Co.
Replacers, Car
Columbia M. W. & M. I. Co.
Replacers, Car
Columbia M. W. & M. I. Co.
Resistance, Grid
Columbia M. W. & M. I. Co.
Resistance, Grid
Columbia M. W. & M. I. Co.
Resistance, Troiley. (See
Tatchers and Retrievers,
Troiley)
Rheostate
General Electric Co.
Westinghouse Elec. & M. Co.
Resistances
Consolidated Car Heating Co.
Retrievers, Troiley.
Troiley)
Rheostate
General Electric Co.
Westinghouse Elec. & M. Co.
Rosing, Car
L'antasote Co. The
Roller Bearings
Stafford Roller Bearing Car
Truck Co.
Ronders, Track
Sanders, Track
Co.
Ronders, Track
Co.
Residence
Co.

Truck Co.
Ruofa
Haskelite Mfk Co
Sandera, Track
Brill Co., The, J. G.
Columbia M. W. & M. I. Co
Electric Service Supplies Co
Niebala Lintern. Co.
Ohio Itrasa Co.

Insulated
Electric Service Supplies Co.
Seating Materials
Brill Co., J. G.
Pantasote Co., The
Standard Textile Products

Corp. Seats, Car. (See also Rattan) Amer. Rattan & Reed Mfg.

Amer. Rattan & Reed Mfg.
Co.
Co.
Co.
Co.
Brill Co., The, J. G.
Hale & Kilburn Corp.
Heywood-Wakefield Corp.
Peters & Co., G. D.
St. Louis Car Co.
Second-Hand Equipment
Electric Equipment Co.
Seeret Service
Corporation Service Bureau.
The

Corporation Service Bureau.
The
Securities Electric Railway
Bonbright & Co.
Shades, Vestihule
Brill Co., The, J. G.
Shovels, Power
Brill Co., The, J. G.
Signals, Car Starting
Consolidated Car Heating Co.
Co.
Electric Service Supplies Co.
Nat'l Pneumatic Co., Inc.
Signals, Indicating
Nichole-Lintern Co.
Signals Holicating
Nichole-Lintern Co.
Signal Systems, Ribek
Electric Service Supplies Co.
Nachod Signal Co., Inc.
Union Switch & Signal Co.
U. S. Electric Signal Co.
Wood Co., Chas. N.
Signal Systems, Highway
Crossing
Nachod Signal Co., Inc.

Signal Systems, Highway Crossing Nachod Signal Co., Inc. U. S. Electric Signal Co. Slack Adjusters. (See Brake Adjusters)

Slag Carnegie Steel Co.

Carnegie Steel Co.
Sleet Wheels and Cutters
Anderson Mfg. Co., A. &
J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Ry. Equip. Co.
Electric Service Supplies Co.
More-Jones Br. & Metal Co.
Nuitall Co., R. D.
Smokestacke, Car
Nichols-Linierm Co.
Snow-Plows, Sweepers and
Brooms
Amer. Ratian & Reed Mfg.
Co.

Snow-Plows, Sweepers and Brooms
Amer. Ratian & Reed Mfg. Co.
Brill Co., The, J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
McGuire Cummings Mfg. Co.
Soldering and Brasing, (See Welding Processes and Apparatus)
Spikes
Amer. Steel & Wire Co.
Special Adhesive Papers
Irvington Varnish & Ins. Co.
Splieling Compounds
Westinghouse Elec. & M. Co.
Splieling Sleeves. (See Clamps
and Connectors)
Springs, Car and Truck
Bemis Car Truck Co.
Brill Co., The, J. G.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
Sprinklers, Track and Road
Brill Co., The, J. G.
McGuire Cummings Mfg. Co.
Steel and Steel Products
Morton Mfg. Co.
Steps, Car
American Mason Safety
Tread Co.
Morton Mfg. Co.
Stokers, Mechanical
Babcock & Wilcox Co.
Vestinghouse Elec. & M. Co.
Storage Batterles. (See Batterles, Storage)
Strain Insulators
Onto Brass Co.
Strand
Roeblings' Sons Co., J. A.
Suhway Boves
Johns-Prate 10.

Koeblings' Sons Co., J. A Suhway Boves Johns-Pratt Co. Superheaters Babcock & Wilcox Co. Power Specialty Co. Sweepers, Snow. (See Sn Plows, Sweepers s Brooms.) Switch Stands Indianapolis Switch & Froz

Indianapo...
Co.
Ramapo Alax Corp.
Switches. Safety
Johns Pratt Co.
Switches, Selectur
Nichols Lintern Co.

Switches, Tee Rall
Ramapo Ajax Corp.
Switches, Track, (See Track,
Special Work)
Switches and Switchboards
Anderson Mfg. Co., A. &
L. M.
Electric Servivce Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Synchruscupes
Roller-Smith Co.
Tampers, Tie
Ingersoll-Rand Co.
Railway Track-Work Co.
Tapes and Cloths, (See Insulating Cloth, Paper and
Tape)
Tee Rall, Special Track
Work
Ramano Aire Corp.

Tapes and Cloths, Gee Insulating Cloth, Paper and Tape)
Tre Rail, Speelal Track
Work
Ramapo Ajax Corp.
Telephones and Parts
Electric Service Sup, Co.
Western Electric Co.
Testing Devices, Meter
Johns-Fratt Co.
Testing Instruments. (See Instruments, Electrical Measuring, Testing, etc.)
Thermostats
Consolidated Car Heating Co.
Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter
Thread-Cutting Tools
Willams & Co., J. H.
Tleket Choppers and Destroyers
Electric Service Supplies Co.
Tickets and Transfers
Globe Ticket Co.
Ties, Mechanical
Dayton Mechanical Tie Co.
Ties and Tie Rods, Steel
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.
Tougue Switches
Wharton, Jr., & Co., Inc.,
Wm.
Tool Holders

Wharton, Jr., & Co., Inc., Wm.
Tool Holders
Williams & Co., J. H.
Tool Steel
Carnerse Steel Co.
Tools, Track and Mise.
Amer. Steel & Wire Co.
Columbia M. W. & M. J. Co.
Electric Service Supplies Co.
Hubbard & Co.
Bailway Track-work Co.
Tools, Thread Cutting
Williams & Co., J. H.
Towers and Transmission
Stractures
Archbold-Brady Co.
Baites Expanded Steel Truss
Co.

Co. Westinghouse Elec. & Mfg. Co.

Track Grinders
Railway Track Work Co.
Seymour Rail Grinder C
E. P.

E. P.
Trackless Trolllears
St. Louis Car Co.
Track, Special Work
Barbour-Stockwell Co.
Bethlehen: Steel Co.
Indianapolls Switch & Frog
Co.

Co. New York Switch & Crossing Co.
Ramspo Ajax Corp.
Wharton, Jr., & Co., Inc.,

Wm.
Transfer Isaulng Machines
Ohmor Fare Register Co.
Transformers
General Electric Co.
Westinghouse Elec. & M. Co.
Treads, Safety, Stair, Oar
Step
Amer. Mason Safety Tread
Co.

Step
Amer. Mason Safety Tread
Co.
Morton Mfg. Co.
Trolley Bases
Ackley Brake & Sup. Corp.
Anderson Mfg. Co., A. &
J. M.
Electric Service Supplies Co.,
General Electric Co.,
Nat'y Ry., Appliance Co.,
Nuttall Co., R. D.
Ohio Brass Co.
Trolley Bases Retrieving

Ohio Brass Co.
Trolley Bases, Retrieviox
Ackley Brake & Sup. Corp.
Anderson Mfg. Co., A. &
J. M.
Electric Service Supplies Co.
General Electric Co
More-Jones Br. & Met. Co.
Nat'y Ry. Appliance Co.
Nuttall Co., B. D.
Ghio Brass Co.
Trolley Bases
Brill Co., The. J. G
General Electric Co.
Westinghouse Elec. & M. Co.
Trolley Materials
Electric Supplies Co.
Ohio Brass Co.
Trolley Materials
October Supplies Co.
Ohio Brass Co.
Trolley Materials, Overhead

Trolley Materials, Overhead More-Jones Brass & Metal Co.

A List of Transportation Companies which have ordered Johnson Fare Boxes during 1922

HLINOIS
Chleago—Chleago Surface Lines;
Reo Motor Car Co.; Universal
Bus Co.
Rockford—Fay Motor Bus Co.;
Rockford & Interurban Ry. Co.
Berwyn—West Suburban Transportation Co.
Maywood—Speedway Auto Bus Co.
Evanston—Evanston Ry. Co.
Highwood—Chleago, No. Shore &
Milwaukee Elec, R. R. Co.
MAINE
Augusta—Central Maine Power
Co. ILLINOIS

Co.

Biddeford—Biddeford & Saco
R. R. Co.

NEW HAMPSHIRE

Nashau—Nashau Street Rallway
Co.

Nashau—Nashau Street Rallway
Co.
MASSACHUSETTS
Wohurn—Wohurn & Reading Bus
Line.
Boston—Boston Elev. Ry. Co.;
Linscott Motor Co.
Plymouth—Plymouth & Breckton
St. Ry. Co,
Worcester—H, B. Carter; Worcester & Rochdale Rus Line.
Gloucester—Gloucester Auto Bus
Co.

Go.

Go.
Malden—Hart's Bus Line.
Hyde Park—Norfolk & Bristol
Bus Co.
Ayer—Lowell & Fitchburg St.
Ry. Co.
Cambridge—Mack Motor Truck—
Co.
CONNECTICIT

CO. CONNECTICUT

New Haven—The Connecticut Co.;

New Haven Commercial H. S.

Warehouse Pt. — Hartford &

Springfield St. Ry. Co.

New Britain—Ernest Nyquist;

Theo. E. Wagner.

Bristol—Bristol & Plainville Elec.

Bristol—Bristol & Plainville Elec.
Co.
New London—Mike Baldelli.
NEW YORK
NEW YORK
NEW YORK
New York City—Melchlor, Armstrong & Dessau, Inc.: Tracklected to the strength of the strength of

Cortiand—Brockway Motor Truck
Co.
Schenectady—Schenectady Ry. Co.
Brooklyn—Joseph Z'tter; Jacoh
Solomon: Rauschwerget &
Reisfield; Joseph Friedman;
Max Meyers; Herman Perloman;
Witz; Isaac Boreustein.
Poughkeepslo — Poughkeepslo &
Wappinger Falls Ry. Co.
Lymbrook—Carter & Carter.
Long Island—Chas. Wood; Chas.
Woop; N. Y. & Queens County
Ry. Co., Woodslde, L. I.
Rensselaer—Albany, Southern R.
R. Co.
Newburgh—Grange County Terri

Newburgh-Grange County Trac.

Co.

PENNSYLVANIA

Philadelphia—J. G. Brill Co.
Mt. Holly Springs—Carlisle &
Mt. Holly Ry. Co.

Norristown—Philadelphia & Westgen By. Co.

ern Ry Co. Jersey Shore—Jersey Shore Elec. Allentown - International Motor

Allentown — International Motor
Ca.
Shonandoal—Shenandoah
Suburbau Bus D. ERSEY
Jersey City — Montgomery &
West Sittous Covers Pot.
Avenue Line; Hudson County
Bus Owners Arsi'n; Greenville
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Hardey Base Co.; Jos. Enriarde hardt. Long Branch—C. E. Dennis, W~hawken — West Shore & Woodcliffe Rus Owners Ass'n. Bayanne—Bayonna Bus Owners Ass'n.
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Co.
West Hoboken—Corcoran's Gar-

age.
Whitestone—Post Exchange, U.
S. Army, Ft. Totten,
No. Rergen—West N. Y. & Ho-baken Jitney Owners Ass'n.; Howard Keynton. Red Bank—Burdge & Russell. Fairview—Brooks & Bartenwerf-fer.

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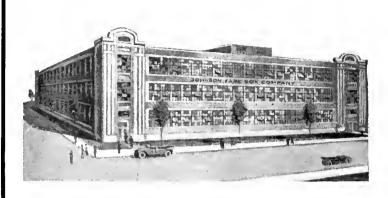
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Wrenches Williams & Co., J. H.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
A	F.	K	Ramapo Ajax Corp 97 Bichey, Albert S 42
Ackley Brake & Supply Corp. 99 Alax Metal Co. 71 Allis-Chaimers Mfg. Co. 102 Allison Co. J. E. 42 Amer. Brake Shoe & Fdy. Co. 110 American Car. 117 American Electrical Works. 101	Earll, C. I. 78 Eclipse Railway Supply Co. 103 Economy Electric Devices Co.26, 27 Edgemoor Iron Co. 60 Edwards Co. Inc., The O. M. 88 Electric Equipment Co. 111 Electric Ry. Equipment Co. 21	Kerite Insufated Wire & Cable Co	Robinson & Co., Dwight P. 43 Roebling's Sons Co., John A. 104 Roller-Smith Co. 97 Rome Wire Co. 104 Rocke Automatic Register Co. 109
American Insulating Machinery	Elec. Ry. Improvement Co: 98 Electric Service Supplies Co14, 15	Le Carbone Co110	s .
Amer. Mason Safety Tread Co. 108 Amer. Motorway Equip. Co. 44 American Rattan & Reed Mfg. Co. 109	English Electric Co A	Le Grand, Inc., Nic., 100 Lorain Steel Co., 65	St. Louis Car Co
American Steel & Wire Co10dl Anaconda Copper Mining Co10d	F	M	Sanderson & Porter
Anchor Webbing Co	Feustel, Robt. M. 42 Flood City Mig. Co. 64 Ford, Bacon & Davis. 42 Ford Chain Block Co. 107 "For Sais" Ads. 111	McGuire Cummings Mfg. Co	Seymour Rail Grinder Co., E. P. 106 Smith & Co., C. E
В	G	More Johns Brass Metal Co 80, 81	Star Brass Works
Babeock & Wilcox Co	Gslena-Signal Oil Co	N	Stucki Co., A
Bayonet Trolley Harp Co 90 Beekwith Chandler Co 47	Gold Car Heating & Ltg. Co 109	Nachod Signal Co 55	T
Beeler	## Ha'e & Kilburn Corp	Nashville Tie Co	Taylor Electric Truck Co
	Hemphill & Wells		Union Switch & Signal Co 18
C Cameron Electric Mfg. Co108	Hulst_Englehard W	4)	U. S. Electric Signal Co
Carnegie Steel Co	,	Ohio Brass Co	V
Collier Inc. Rarron G86, 87 Columbia M. W. & M. I. Co 102 Consolidated Car Fender Co 05			Van Dorn Coupler Co101
Consolidated Car Heating Co., 28 20 Copper Products Forging Co. 83	Ideal Face Shield Co. The 59 Indianapolis Switch & Frog Co. 62	ŀ.	
Corporation Service Bureau The 13 Creaghuid Engineering Co	Ingersoll-Rand Co	Parsons, Klapp, Brinckerhoff &	W
Crossett James H 13	striction Co	Douglas \$2 Pantasote Co 81 Paxson Co., J. W 105 Perey Mfs. Co., Inc. 110	"Want" Ads
D	Irviogian Varnish & Insulator	Peters & Co	Western Electric Co
Domon Chapman Co 100 Day & Zimmerman Inc 4.3 Bayton Air Brush Co 0.0 Dayton Mechanical Tic Co 50, 50 Differential Steel Car Co The 32, 33	J	Power Specialty Co 100	West'gh'se Traction Brake Co Wharton, Jr & Co., Wm 49 Wheel Truing Brake Shoe Co White Eng Corp. The J G 42 Williams & Co. J II 100
Dott J N 43 Dossert & Co 1 12 13 Dossert & Co 43 Drum & Co V L 12 12	9 bitti (1) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Railway Pullty Co 102	Williams & Co. J. H. 100 Wish Service, The P. Edw. 43 Witt, Peter

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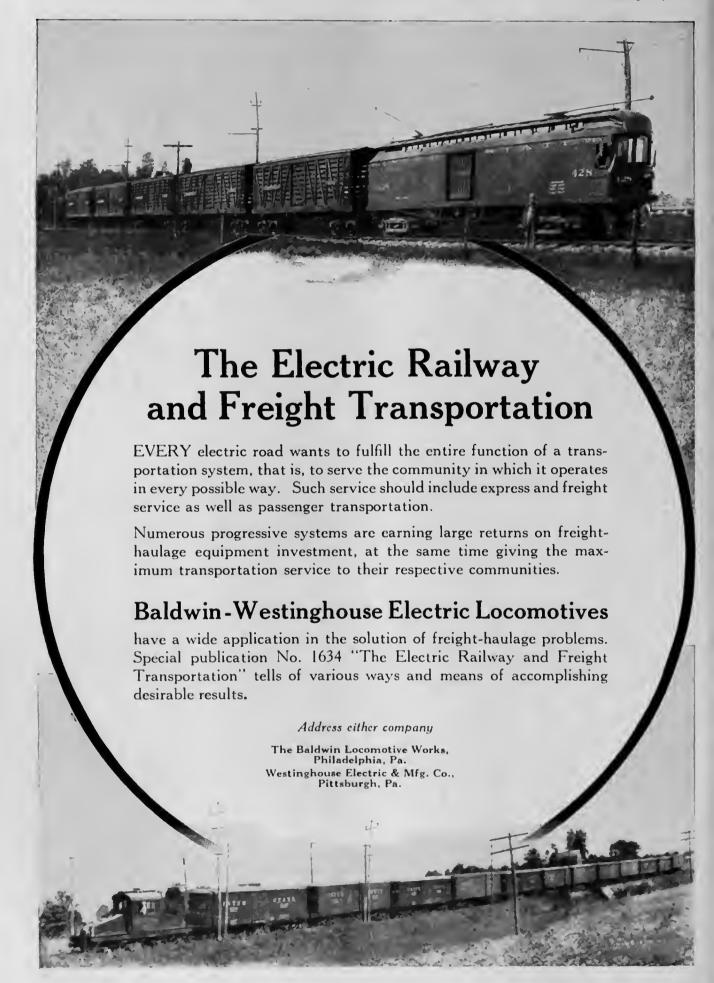
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CONTENTS

The Sydney Tramway System......71

Is owned and operated by the New South Wales government and last year carried nearly a million passengers a day. The traffic problems cover unusual street congestion and large crowds to and from races and other outdoor events in Sydney.
Baltimore Vehicular Traffic Study
A recent survey in Baltimore shows that car movement during the evening rush is greatly impeded by automobiles, which carry a very small proportion of the traffic out of the business district.
New York, London, Paris and Berlin Transit Compared75 By DANIEL L. TURNER.
While social and other conditions greatly affect city transit there is much that can be learned from the properties abroad, especially methods of merchandising transportation.
New Cars for East Boston Tunnel8
Boston Elevated Railway develops car for rapid transit service weighing with motor equipment only about 1,000 ib, per passenger seat or 250 lb. per passenger on the basis of total rated carrying capacity.
Substitution of Buses for Street Cars in New York City87
BY JOHN A. BEELER. The bus is not well adapted to mass transportation because of the small overload capacity. The cost of bus operation per passenger, exclusive of pavement wear, is higher than that of the street car.
The Readers' Forum89
Association News and Discussions92
Maintenance of Equipment94
New Equipment Available96
News of the Industry97
Financial and Corporate102
Traffic and Transportation
Personal Mention106
Manufacturers and the Markets107
The state of the s

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What the Subscribers Think of the Journal

EEK before last this column contained a few extracts from letters written to the editors expressing comment on the worth of the JOURNAL. Herewith are more comments from the subscribers.

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-H. F. R., Engineer.

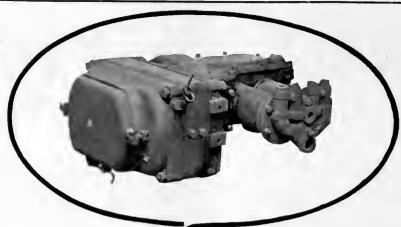
Has Journal Furnished to All His Staff

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Subjects Treated with Impartiality

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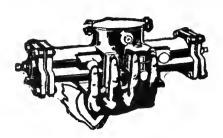
shafts pass up through this steel base plate and the door shaft top bearings are riveted to the plate, the engines being connected with rods less than 2 ft. long. This base plate construction makes the engine and the door shafts a complete mechanical unit which will operate properly regardless of vibration. The door-shaft mechanism is ball bearing with taper-thrust collars which allow free movement even though the car platforms may sag or twist and throw the equipment out of line.

The folding step mechanism is also ball bearing with the same advantage of free movement should the step be knocked out of line. Another advantage of the ball bearings is the ease with which they are renewed. The thrust collar keeps the wear off the shaft, while with a plain or sleeve bearing both the shaft and housing wear. The step mechanism is connected to the door shafts by means of the National Pneumatic Company's slide bar device, which insures perfect adjustment when new and provides for adjustment to take up wear from time to time as required.

The engine connecting rods are connected to the door shafts through adjustable levers, which provide for perfect adjustment of doors both open and closed and the proper movement of both doors in unison. These levers also provide for taking up the slack due to wear so that the doors may be kept in the same operating condition regardless of the length of time the car is

bottom door guides and catches insure the pro degree . o the door

> From Electric Railway Journal Dec. 9, 1922



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Only another one of several orders already received for National Pneumatic Devices on new cars which the Hydro Electric Railway Commission is putting into services in various Canadian cities.

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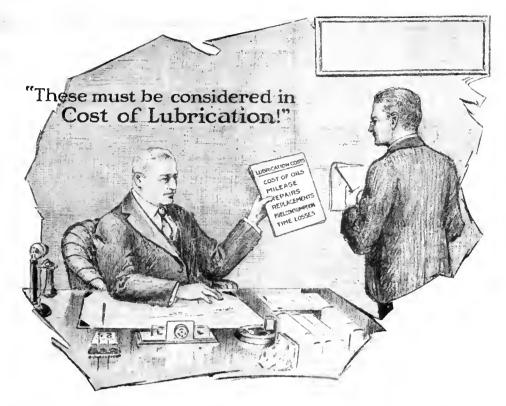
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Practical executives know that lubrication means something more than the purchase of so many gallons of oil.

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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

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Number 2

When It Comes to Seats Get Comfort First

COMMUNICATION signed "Critic" published A elsewhere in this issue ridicules those railway men who have purchased slat seats for recently built cars. While "Critic" goes pretty far in his discussion, there is some merit to his contention. Many railway men have long since been capitalizing upon the merchandising value of the spring cushion, even to the extent of insisting on its installation in the safety cars against the counter efforts of the stanch light-weight advocates. The car rider hardly expects the same luxury in deep spring seats on a street car that he finds in his or his neighbor's automobile, when he pays but a few cents for his ride. Nevertheless, a slat seat, or an unsprung car seat covered with rattan, does offer a very noticeable contrast, and hence helps to make the car rider want less to make his travel by street car. People do not like unsprung seats, and incidentally they do not like longitudinal seats. Certainly this matter of comfort and the ruling likes and dislikes of patrons is a very important factor in the general problem of merchandising transportation. The ride must be made as attractive as possible commensurate with the price, and it would seem that the slight saving in weight or the slight saving in first cost and maintenance from the use of slat seats are of minor importance as compared with the difference in degree of passenger comfort between slat seats and cushion seats and backs.

A Good Time to Start an Employee Thrift Organization

ELECTRIC railways can well encourage thrift movements among their employees. Some companies, like the Philadelphia Rapid Transit Company, have already taken steps along this line, even to the extent of having weekly account books printed especially for their men. An employee with property is likely to be a better workman than one without, one reason being that he can keep his mind on his work better because he has less financial worry.

During the war several extended campaigns were inaugurated to encourage corporations to start thrift organizations among their employees, and the electrical industry took a special interest in them because of the strong advocacy of such a plan by Henry L. Doherty, who personally gave a great deal of time to the study of various plans of employee thrift organizations. These campaigns were conducted, in a number of instances, under the name of Franklin, because in "Poor Richard's Almanac" and in other writings Benjamin Franklin made a great point of the virtue of thrift.

Fortunately, the idea is not being dropped with the termination of the war, and the fact that Jan. 17, 1923, will be the anniversary of the birth of Franklin has led to the naming of next week as "National Thrift Week." The announced purpose is to organize 5,000

Benjamin Franklin thrift clubs in industrial and commercial organizations, and in other ways to stimulate individuals to think straight and act wisely in regard to personal money matters in the realm of earning, spending, saving, investing and giving.

The encouragement of a thrift club is something which could well be taken up by every electric railway beneficial association. The conditions surrounding railway employment are such as to stimulate the practice of thrift. To a greater extent than in almost any other industry, the railway man has continuous employment and so can plan a personal budget and provide for a certain amount of saving better than a man in irregular employment. On its side the company will gain because a man who acquires regular and methodical habits about his personal expenditures will be likely to be more methodical and careful in his daily work.

Automobiles in Downtown Streets Should Be Limited

VIDENCE is increasing on all sides that some Event is increasing on the use of restriction will have to be placed on the use of the downtown business streets of our cities by auto-Otherwise, the streets will fail in their function of providing the means by which traffic may move expeditiously. While the problem is more serious in some cities than in others, and naturally is more acute where the downtown streets are narrow, yet it is a matter which is of concern in practically every city with a population of more than 100,000. It may seem radical at first sight to limit the use of a public street to a vehicle owner when he has always been free in the past to drive where he wished. Nevertheless, in the interests of the majority, the time is coming, if it is not already here, when authorities will have to favor those vehicles which are economical of street space per passenger carried and restrict others.

Just how the automobile stands in this respect as compared with the electric car is shown by a recent traffic survey in Baltimore, where during the evening rush hour it was found that on the downtown streets upon which both street cars and other vehicles operate the automobiles represented 73 per cent of the total movements and the street cars only 27 per cent, whereas the street cars accommodated 88.8 per cent of the total passengers and the autos only 11.2 per cent. This corresponds, on a basis of traffic movement, to an efficiency more than twenty times as great for the electric car as for the automobile.

The evil of the automobile as a wasteful occupier of space is not limited to moving cars. The parked car is a still more wasteful use by certain individuals of public property, as well as a perversion of the streets from their original purpose, which was to permit traffic movement, not to provide free storage. It has been sometimes said that if stops, except for a limited time to discharge passengers, were forbidden, the automobile

drivers would keep moving around on the streets and so cause more congestion than if they remained in one spot. This might be so if every automobile was continuously in charge of a driver. Actually there would undoubtedly be a considerable reduction in the number of cars taken downtown with a law like this in force, because it would then exclude those business men who drive their own cars and leave them parked all day.

Altogether the question is not an easy one to settle, but at least some steps can be made toward its solution.

Some Lessons We Can Learn from Europe

It is notable that electric railway engineering as practiced in the United States and electric railway engineering as practiced in Europe do not differ very greatly. In fact, the differences between the practice in this country and in any European country are probably no greater than those which would be noticed in comparing the practice of that country and that of some other in Europe. Thus the United States and Great Britain differ in regard to the use of double-deck cars, most of the cars in Great Britain being of that type, while there are very few here. But double-deck cars are also very uncommon on the Continent of Europe. It is the same way with the bow trolley. This form of construction is quite common on the Continent of Europe, but non-existent in Great Britain, as here.

In the matter of transportation methods a somewhat different condition prevails. Here the human element is predominant, and different conditions have brought about different results. Attention is directed to some of these points of difference in a report just presented by Daniel L. Turner to the New York Transit Commission and abstracted on another page. One striking point brought out in this report is the far more strict adherence to rules on the part of European crowds. This may be due to centuries of military training. There seems also to be a greater realization on the part of both the general public and the authorities of the need for good city transit and therefore of the desirability of co-operating with the transit companies. An example is given in the last meeting of the International Tramway Union in Brussels, where there were twenty-seven delegates officially appointed by their respective governments to attend. This difference in public regard was wittingly described by an electric railway operator some time ago who said that the prominent railway manager in Great Britain was rewarded by being knighted and in the United States by being indicted.

Another striking point of difference to which Mr. Turner and others returning from abroad have pointed is the better methods used by European railways to give travelers the information that they want to know. This is done in a variety of ways, as by signs on the cars, maps in poster or folder form, direction signposts and a thousand and one other ways which make traveling by street car abroad easy for the stranger. There may not be quite the same need here for this kind of information, because so many of our cities are laid out with rectangular blocks and numbered streets, but even in these circumstances adequate direction signs are not only helpful but they do much to encour-The similarity of the remarks of Mr. age travel. Turner to those made by other returning travelers on this matter indicates that American companies could well copy some of the European practices.

Now Is the Time to Help the Rail Joint Committee

THE work of the committee on welded rail joints is at exactly the stage, at present, when it can benefit most by the suggestions of those who are qualified to make them. It is important that definite designs of testing machines be decided upon and, to a certain extent, the testing procedure also. The committee asks for the best thought of engineers and others to help it reach safe and sane conclusions. The response should be prompt and thoughtful.

To start the ball rolling there is printed elsewhere in this issue a digest of correspondence relating to the method, place and time of curving the joints, to the use of flangeless wheels on the trucks of the rotary testing machine, etc. This correspondence has been taking place between the United States Bureau of Standards and the committee, and among the members of the committee. It brings out the fact that there is so far a very fair degree of unanimity as to the general principles, the differences of opinion being largely as to details. This fact, however, need not restrain any one from criticising adversely any of the opinions expressed.

The Man Who Had Nothing to Sell

THIS is a true story, and, as Shakespeare remarked, "Pity 'tis, 'tis true!" It concerns an electric railway manager who applied for membership in the local Commercial Club shortly after its organization. The club seems to have been more selective than is the wont of such bodies. Our manager's application, at any rate, came up before the membership committee. It was rejected on the ground that the applicant was an electric railway operator and therefore was not eligible under the rules of the club because he had nothing to sell!

So far from being flabbergasted by this unexpected rejection, the railway man took the reason to heart and pondered it seriously. Was he really in the business of selling something or did the major part of his job consist in sitting around waiting for passengers who had to ride or for an accident to occur? "Every day and in every way" he could see how the individuals who had been accepted as members in the Commercial Club kept finding new reasons—and advertising those reasons—for the use of their products. He was forced to admit to himself that all the selling the railway did was of the "order-taking" variety. It did not go after business. It waited for customers to come along.

Looking more deeply into the matter, our manager discovered that he was needlessly handicapped by the uncommercial manner he had of pricing his goods. About all the differentiating he did was between the cash rider at 8 cents and the people who were so liheral as to invest the price of five rides for 35 cents to be used when they felt like riding in a car instead of in an automobile. Both classes were grumblers. Few passengers seemed to be really consistent patrons, but why not find out how many would be willing to use the service at wholesale if they could get a truly wholesale rate? This led to the adoption of weekly commutation, hand in hand with an advertising campaign in cars, newspapers and theaters. This innovation made so powerful an impression upon the membership committee of the Commercial Club that they did not wait for the railway manager to renew his application. They hunted him up to offer him membership, for had he not proved at last that he had something to sell?



Loading Passengers at the Agricultural Fair Grounds, Which Attract Large Crowds of Exhibitors and Spectators

The Sydney Tramway System

Is Owned and Operated by the New South Wales Government and Last Year Carried Nearly a Million Passengers a Day—The Traffic Problems Include Street Congestion in the Business District and Transportation of Large Crowds to Races and Other Various Popular Outdoor Events in Sydney

THE city of Sydney, New South Wales, in the southeastern part of the continent of Australia, is the capital and chief city of New South Wales. According to the census of 1914 there was a population within the city boundaries of 110,700, but including the neighboring suburbs the population was 641,800. The Sydney district has a magnificent harbor, into which a considerable part of the city proper juts as a peninsula, but the metropolitan area lies on a much larger peninsula between the Parramatta River and George's River, and includes many flourishing suburban municipalities. To the north, just across the Bay of Port Jackson, there are also other communities, including North Sydney.

All the tramways in this extensive district, as well as the steam railways of New South Wales, are owned by the New South Wales Government, so that there has been co-ordination in the development of both, and the tramway system has been extended so as to serve practically all of the surrounding suburbs as well as the city of Sydney itself, although politically they are distinct municipalities.

TRAMWAY STATISTICS

The first tramway line was opened in 1879 as a horse line $1\frac{1}{2}$ miles in length. This had increased up to June 30, 1922, to 229 miles of route or 366 miles measured as single track. The total capital cost of this property on the same date is given in Table I.

This represents an average for track per mile of route of £21,579, for the remainder of the equipment

RYDE RAILWAY STATION Fort Macquarie Watsons Bay CIACULAR QUAY illers Abbotsford ouble Darlinghurst Sports Ground CENTRAL RY. STA Cooge Victoria Park RaceCourse Randwick Rosebery Park Race Course Tramways Railways Asco† Tramway Fare Race Course Sections La Perouse

Map Showing Tramwuy System In Sydney

per mile of route, £19,889, or a total of £41,468. Additions to the tramway capital during the year ended June 30, 1922, were £444,975.

In addition to some track extensions a great deal of work was done in track rehabilitation. The corrugation on 23½ miles of rails was ground out and 2,700 pieces of special trackwork and 8 miles of track were rehabilitated in place by electric welding, at a cost per piece of special work of £1 10s. and for rails

TABLE I-CAPITAL COSTS OF SYDNEY TRAMWAY SYSTEM
Track construction £4,946,572 Rolling stock
Power station, substations and transmission system 1,901,897 Machinery 182,519
Repair shops
Stores, advance account
* Total



The Business Portion of the City of Sydney Lies Between the Two Points Shown in These Two Views

The upper view was taken at Circular Quay at the northern end of the city, where there is a ferry service to the opposite side of the bay. The conditions here are not unlike those at the ferry house at the foot of Market Street, San Francisco. The lower view shows the plaza at the western entrance to the Central Railway Station. The passenger trains stop here about a mile from the center of the city proper,

and from this point passengers are conveyed by street car to and from the city. The steam trains from this point run south and west.

The traffic is becoming so dense in the streets in the business district of Sydney that a subway is under consideration. On such a system, the two points which have been mentioned would be important traffic centers.







Typical Pictures Showing Congested Street Conditions in Downtown Sydney. During the Rosh Itonr the Schedule Calls in Some Cases for a Car Across a Crossing Every Eight Seconds

of 2s. 11d. per foot. In this track rehabilitation and construction, extended use has been made of pneumatic equipment, including pneumatic wood borers, drills and tie-tamping machines.

During the past year also a number of additions have been made to the power equipment. The generator capacity has been increased by two 2,500-kw. turboalternators and it is expected that another of 2,500 kw. and one of 18,750 kw. will soon be installed. Three 1,000-kw. rotaries have been ordered, considerable overhead construction has been renewed and additional machinery and tools have been added to the shop.

In the car shops 633 electric cars have been overhauled and 486 were repainted; 352 trucks received a thorough overhauling or general repairs and 1,579 armatures were rewound. Vacuum drying and solid compound impregnating plants have been manufactured and installed for coil treatment.

In addition thirteen cars were built at the shops and put into service during the year and fourteen more are in process. It is intended to add seventy-five more cars, of which twenty-five will be built in the government shops and fifty let to local contractors.

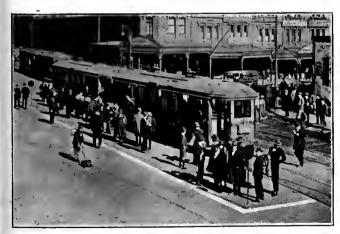
A few financial statistics will now be given in Table II before an account of the operating conditions on the property. For the convenience of the American readires, the figures given in this report have been changed to dollars on the basis of a pound being worth \$4.50. This ratio of exchange is of course considerably lower than that which existed in the years 1907 and 1888.

There are a number of special conditions which affect

traffic in Sydney, which must be realized for a thorough understanding of the means adopted for overcoming them.

In the first place, the city has a very large number of parks, and the equable climate encourages the use of these parks generally throughout the year. In the second place, the fondness of the population for sports, particularly athletic contests, attracts to these events not only the citizens of Sydney and surrounding neigh-

TABLE 11	-RESULTS	OF OPER	RATION	
SYDNE	Y TRAMWA	AYS, ALL L	INES	
		-Year Endee	l June 30	
Particulars	1922	1921	1907	1888
Amount expended on con- struction and equipment., Cost per mile open including	\$42,775,794	\$40,773,40 6	\$16,512,858	\$3,947,598
repair shops and rolling stock	186,606	179,388	128,331	102,537
Total route-miles open for traffic. Earnings Operating expenses.	229½ \$16,245,607 13,570,272	227½ \$15,622,821 13,244,634	128 ² \$4,089,154 3,275,761	\$1,064,335 986,382
Earnings less operating ex- penses	2,675,335	2,378,187	813,393	77,953
Percentage of profit to capital invested	6.40 83.53	5.94 84. 7 8	4.94 80.11	1.98 92.67
Earnings per average route- mile open	\$71,172	\$69,052	\$32,134	\$28,008
Working expenses per average route-mile open	59,449	58,540	25,744	25,956
Return per average route- mile open (after paying operating expenses) Earnings per ear-mile, cents. Operating expenses per ear-	11,723 54,3	10,512 55.4	6,390 24 .3	2,052 76.4
mile, cents	45.4	46.9	19.6	70.8
Return per car-mile (after paying operating ex- penses), cents	8.9	8.5	4 7	5.6
ried	330,938,567 29,318,532	337,689,873 28,654,172	155,017,982 16,620,434	1,388,786
* Not obtainable.				



Safety Zones Huve Been Introduced in Recent Years to Good Advantage



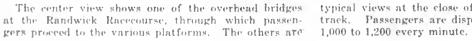
The Motnrmen Receive Their Instruction in This Schoolroom

The Racetracks Attract Enormous Crowds and the System of Loading Passengers at the Conclusion of a Meeting Has Been Carefully Worked Out











typical views at the close of an afternoon at the racetrack. Passengers are dispatched at the rate of from 1,000 to 1,200 every minute.

borhood, but also of more distant parts of New South Wales and from the other five states of the Commonwealth of Australia.

Another factor stimulating traffic in Sydney is the fact that the steam railroad services terminate in general about 1 mile from the center of the city, so that from this point passengers desiring to go "downtown" must take the trolley system. The suburban steam service, as shown in the map, extends south and west, leaving the other suburban districts to be served exclusively by the electric cars. The electric lines run in some instances adjacent to the steam railroad lines, but none of the racecourses, fair or sport grounds is served by the steam railroad. In addition to the steam railroads which serve the region south and west of Sydney, there is a very large ferry service at the north of the city to the suburban population across the bay. All these conditions tend to increase traffic. There are, however, some traffic difficulties, since the streets in the lower part of the city are narrow and there are many steep grades. Some of these conditions are set forth in two previous articles which have been published in this paper on the Sydney system, namely, in the issues of Aug. 5, 1922, and July 6, 1918. Some traffic statistics follow:

Maximum number of passengers carried on any one day, 1,273,000, carried on Dec. 24, 1920. Largest number carried during 1922 to date, Easter Saturday, 1,180,706. This number was carried in 1,232 cars without any accident. Average number of cars operated per day, 1,160. Maximum number of cars operated per day, 1,343. Headway of cars at most congested crossing during rush hours, eight seconds. This is a four-way crossing at the corner of George Street and King Street. Further particulars of the rush-hour conditions in Sydney were given in the article mentioned in the issue of Aug. 5, 1922.

STAGGERED HOURS FOR SPORTS HELP RAILWAY TO CARRY CROWDS

One of the most successful methods of caring for the heavy holiday traffic is by means of staggered hours. Arrangements have been made with the authorities controlling the various sporting associations to start and finish their programs at different times, so that a dual use can be made of the rolling stock. For instance during the Easter holidays, when some of the largest outdoor events take place, the Agricultural Society opens its fair at 9 a.m., and the racecourse authorities commence their program at 1 p.m., so that the cars can be diverted from one service to the other as the exigencies of the service demand. The ordinary suburban services are reduced to a minimum while there is the rush of traffic to and from the outdoor entertainments. To facilitate the collection of fares on such occasions, arrangements are made by which round-trip tickets are issued to the racecourse, including the entrance charge to the course. The same arrangement about the starting time of these outdoor entertainments is made for the finishing time; that is to say, the closing times are staggered. The closing time for a race meeting is usually between 4:15 and 4:30 p.m.

The loading arrangements at the racecourse are by means of aisle and platforms with overhead gangway and stairs, and with this system it has been possible to haul passengers away at the rate of 1,000 and 1,200 a minute. After these cars have run into town and

discharged their load they are sent to the agricultural grounds, which close between 5 and 6 p.m. On some days the Randwick Racecourse traffic is as much as 90,000 passengers in a day.

For its city service the Sydney system has always been inclined favorably to the multi-compartment car with transverse seats back to back and running board on the side. This car was illustrated in the issue of Aug. 5 as the type "P" car. It weighs 36,176 lb., and seats eighty passengers, the weight including the motor equipment with multiple-unit control. This weight corresponds to a weight of 432 lb. per seated passenger, which E. J. Doran, traffic manager of the New South Wales Government Tramways, believes makes it the lightest car per seated passenger in the world.

WAGES RECENTLY REDUCED

The average number of employees on the entire railway and tramway system of the New South Wales Government for the year ended June 30, 1922, was 46,347, of which the tramways employed 9,344. Up to Jan. 1, 1912, the minimum adult wage paid these men was 7 shillings (\$1.68) a day, but during the last ten years there has been a continuous increase in wages, with the peak reached Oct. 8, 1920. At that time the minimum adult daily wage was 14s. 2d. This wage, however, was reduced on Oct. 8, 1921, to 13s. 8d. and again by the Court of Industrial Arbitration on May 12, 1922, to 13s., the reduction to take effect July 28, 1922. These figures correspond respectively to \$3.28 and \$3.12 on the basis of 24 cents to the shilling.

The above information relates to the surface-transportation system of Sydney. There is also being carried out at present a comprehensive rapid transit plan involving extensive subway construction and electrification of the suburban railways. Details of this work will be given in the ELECTRIC RAILWAY JOURNAL from time to time as the construction proceeds.

Electric Cars in Edinburgh

PRINCES' STREET in Edinburgh, claimed by the citizens of that place to be the finest street in the world, has finally been equipped with the overhead trolley. After the decision to remove the cable line on this street was reached, much thought was given to the type of pole to be used and a design was finally selected with short brackets so as to be inconspicuous.

The accompanying illustration shows the first electric car on the street with the temporary bus service in operation during reconstruction.



On Oct, 22 the First Electric Car Was Run on Princes' Street, Edinburgh

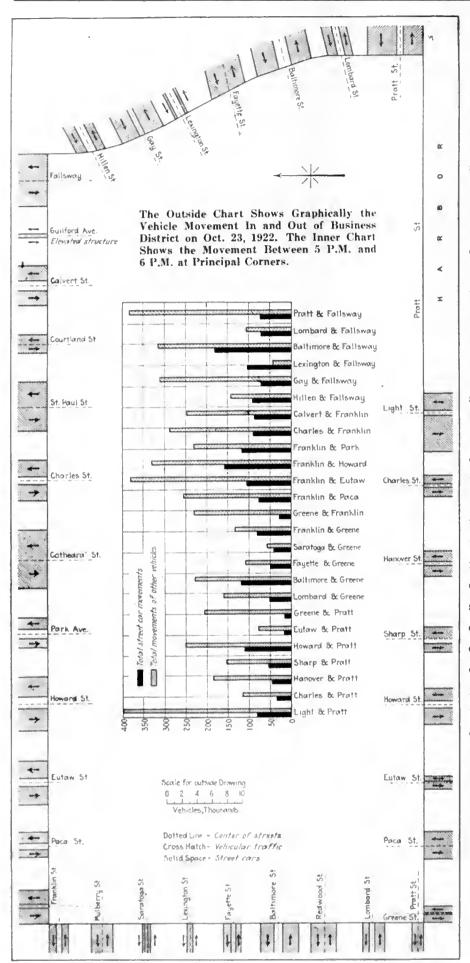


TABLE SHOWING NOMINAL VALUES FOR DATA GIVEN IN THE OUTSIDE CHART

OUTSIDE C	HAR		
Street Intersections		Street	Other Vehicles
Light and Pratt Sts	N S	411 281	2,743 5,034
Charles and Pratt Sts	N S	927	2,947
Hanover and Pratt Sts	N S	522	3,629
Sharp and Pratt Sts	N S	546	1,194 2,399
Howard and Pratt Sts	N S	664 580	2,317 2,623
Eutaw and Fratt Sts	N S	200	960 846
Paca and Pratt Sta	N S		2,036 1,755
Greene and Pratt Sts	NS	106	1,091
Pratt and Greene Sts	E		735 809
Lombard and Greene Sts	E	335 336	1,851
Hedwood and Greene Sta	E		1,614
Baltimore and Greene Sta	E	590 614	2,905 2,553
Fayette and Greene Sts	E	264 261	1,148
Lexington and Greene Sta	E		294 426
Saratoga and Greene Sta	E	169 174	514 537
Mulberry and Greene Sts	E		1,465 1,458
Franklin and Greene Sta	E.	337 347	1,236 1,339
Greene and Franklin Sts	N	199 198	2,172 2,686
Franklin and Paca Sts	N S	351 362	1,988 1,515
Franklin and Eutaw Sts	N S	518 510	2,912 3,153
Franklin and Howard Sts	N.S.	949 557	3,584 3,781
Franklin and Park Ave	N	453 811	2,053 2,127
Franklin and Cathedral Sts	NS		3,607 4,218
Charles and Franklin Sts	N S	423 451	2,709 2,822
St. Paul and Franklin Sts	N S		3,588 3,156
Courtland and Franklin Sta.,	N		1,383
Calvert and Franklin Sta	N	660 688	2,693 2,7 0 0
Calvert and Bath Sts	E		73 114
Fallsway and Hillen Sts	N		3,705 3,543
Hillen and Fallsway Sta	E	647	1.879
Gay and Fallsway Sts	E	317 327	3,123 3,089
Lexington and Fallsway Str	E	609	977 947
Fayette and Fallsway Sts	E		2,439 2,781
Baltimore and Fallsway Sta	E	655 965	3,785 4,146
Lomberd and Fallsway Stv.	E	536 398	1,719
Pratt and Fallsway Sta	E	313 457	3,168 4,635
Gullford Viaduct	N'S	273 273	4,055
Outbound		10,767	
Inbound		10,815	76,047 76,292
Total		21,582	157,339

A recent traffic survey in Baltimore shows that car movement during the evening rush hour is greatly impeded by automobiles, which carry a very small proportion of the traffic out of the business district.

Remedial measures are being considered by the authorities

Baltimore Vehicular Traffic Study

By Joseph A. Stoll

Superintendent of Traffic United Railways & Electric Company of Baltimore

TO DETERMINE accurately the amount of vehicular traffic entering and leaving the business district of Baltimore, a comprehensive check was made by the traffic department of the United Railways & Electric Company on a normal weekday in the latter part of October, 1922. The check began at 6 a.m. and continued until 12 o'clock midnight and required a force of seventy-two checkers working in relays. Similar counts will be made annually in future. It is thought they will be useful not only in working out plans for the efficient development of street car facilities but also as a definite guide in the formulation of such regulations as will insure free movement of traffic to and from and through the congested business district.

The business section of Baltimore, as shown in the route map, lies mainly within the area bounded by Franklin Street on the north, Greene Street on the west, Pratt Street on the south and Fallsway on the east and comprises about eighty ordinary city blocks, i.e., ten blocks east and west and eight blocks north and south. Into this territory the vast bulk of the traffic of the city flows via thirty-seven arteries of travel. On twenty-six of the streets entering this district, street cars are operated, and eleven of the streets are entirely free of car tracks.

Altogether there was a total of 152,339 vehicular movements in and out of the business section, made up of:

Commercial autos. 37,024 Street cars. 21,036 Buses and taxicabs. 4,224	
Buses and taxicabs	
Torse-drawn	94;

The heaviest point for each kind of traffic was:

7	Pleasure autos, Franklin and Cathedral Streets	
	Commercial autos, Pratt and Fallsway	3,058
	Street cars, Baltimore and Fallsway.	1,820
	Horse-drawn, Pratt and Fallsway	1,457

Cathedral Street, upon which there are no car tracks, is the natural outlet for passenger carrying automobiles. The street is wide and well paved, and connects with lateral streets to and through the main residential sections, as well as with the main thoroughfares leading out of the city. Pratt and Fallsway is the heaviest point for commercial vehicles, both motor and horsedrawn, for the reason that it is the gateway to the wharves from the east and southeastern manufacturing districts. Baltimore and Fallsway, while shown to be the heaviest point for street cars, is not congested, as the vehicular movement parallel to the street cars at this point is comparatively light. The points of maximum congestion for both street cars and vehicles are well within the area bounded by the streets at which the check was made.

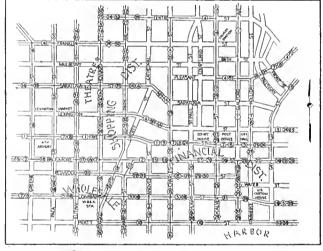
The outside chart on page 76 shows the various

streets entering the business district and illustrates the relative density of traffic on each street for the entire day. It also shows the proportion of street cars to total vehicles inbound and outbound for the entire day. The classification by hours of the total number of vehicles entering and leaving the business district is given in a table on page 78.

The heaviest hour for each kind of traffic was:

Pleasure autos,	5.00 to 6.00 p.m	6.300
Commercial autos,	2.00 to 3.00 p.m	3,941
Street ears,	5.00 to 6.00 p.m	1,926
Haradanan	5 00 to 6.00 p.m	361
marsedrawn,	2.00 to 3.00 p.m	1,400

As in most cities, the morning inbound travel is fairly well distributed throughout the three hours from 6 to 9 a.m., and the afternoon outbound rush travel is



Route Map of Cars Within the Business District

peaked between 5 and 6 p.m. It is interesting to note that during the peak hour there were 6,300 pleasure autos and 1,986 street cars entering and leaving the business district. The automobiles represented 76 per cent of the total movements in this hour and 60 street cars entered and left via the Guilford elevated structure during this hour.

On the streets upon which both street cars and other vehicles operate, there were in the hour from 5 to 6 p.m. 5,360 autos and 1,926 street cars, the automobiles representing 73 per cent of the total movements and the street cars representing 27 per cent of the total movements—whereas, the street cars accommodated 85,050 or 88.8 per cent of the total passengers, and the autos accommodated only 10,720 or 11.2 per cent of the total passengers. To arrive at these figures, two passengers were calculated for each auto and twenty passengers inbound and sixty passengers outbound for each street car, which is a very conservative estimate.

A comparison of all other vehicles with street cars

for the entire day, the p.m. rush and the peak rush follows:

			Per Cent
6 a.m. to 12 mid.	Street cars	21.036	13.7
	Other vehicles	131,303	
4 p.m. to 7 p.m.	Street cars	4.875	17 6
, ·	Other vehicles	22.869	***
5 n.m. to 6 n.m.	Street cars	1.926	17.8
- printer to a printer	Other vehicles	8,899	

There were 4,895 autos inbound during the three morning rush hours, 6 to 9 a.m., and 11,150 or 108 per cent more outbound during the three afternoon rush hours (4 to 7 p.m.). During the p.m. peak hour from 5 to 6 p.m., there were almost as many automobiles outbound as there were inbound during the entire three morning hours, namely, 4,132. The number of street cars entering and leaving the district during the various periods of the day were:

	4,550
4 to 7 p.m	4,875

Due to the lack of effective traffic regulations, the roadways on either side of the car track area are not available for moving vehicles, hence practically all of the vehicles counted on these streets used the car tracks in conjunction with the street cars.

NARROW STREETS INCREASE CONGESTION

Baltimore is handicapped with narrow streets to the extent that all traffic movement is very seriously interfered with, particularly during the congested rush-hour periods. There are comparatively few streets upon which it is possible for a vehicle to pass between a street car and a vehicle parked at the curb and there is no time during the busy hours of the day when the main downtown streets are not occupied with standing vehicles along the curb on each side of the street.

Congestion is intensified by the peculiar topography and physical layout of the city. Crosstown vehicular traffic through this section, which is very heavy, must of necessity use a limited number of streets. This is also true of the majority of ear lines which are throughrouted. Hence the urgent need for unclogging the available arteries or mains through which the currents of travel must flow and for establishing definite routes for through vehicles with such slight detours as will avoid congestion and incidentally enable them to reach their destination in shorter time.

The only measure of relief that has been realized was through the comparatively recent passage of the ordinance which prohibits parking of vehicles on certain downtown streets between 4:30 and 6 p.m. However, when consideration is given to the fact that nearly 90 per cent of all persons anxious to reach their homes after business are carried on the street cars it seems only right and proper that the relief that is possible should be given if only during the p.m. rush hours.

This company has resorted to rerouting its lines in an effort to distribute the car service better and relieve congestion, but while these changes, which were very costly on account of special track connections involved, greatly improved the situation, the constantly increasing use of automobiles shortens the time when drastic measures must be adopted in order to insure a continued improvement in transportation facilities commensurate with the growing needs of the city.

The company recognizes fully the necessity for providing ample rondways and parking places for autos,

TABLE SHOWING CLASSIFICATION OF TOTAL VEHICLES ENTERING AND LEAVING BUSINESS DISTRICT BY HOURS

	Pleasure	Com-	Street	Ruses and	Horse-	
a.m.	Autos	mercial	Cars	Taxicabs	drawn	Total
6.00- 7.00	659	673	1,239	55	393	3,019
7.00-8.00	1,972	1,960	1,589	245	944	6,710
8.00- 9.00	4,849	3,369	1,722	236	1,355	.11,531
9.00-10.00	5.675	3.826	1,296	220	1,435	12,452
10.00-11.00	5.817	3,914	990	271	1,402	12,394
11.00-12.00	5,737	3,407	903	233	1,291	11,571
12.00- 1.00.	5,979	2,998	934	284	1.114	11,309
1.00-2.00.	5,630	3,307	889	290	1.095	11,211
2.00- 3.00.	5.665	3.941	1.038	223	1.466	12,333
3.00- 4.00.	4,892	3.329	1.212	312	1,350	11.095
4.00- 5.00	5,203	2,968	1.621	305	1,199	10.296
5.00- 6.00.	6,300	1.725	1,926	361	513	10,825
4 00 7 00	3,280	621	1.328	255	139	5,623
				244	68	5,636
7.00-8.00.	3,855	344	1,125			
8.00- 9.00.	3,626	239	931	223	25	5,044
9.00-10.00	2,449	190	797	175	17	3,628
10.00-11.00.	7,460	101.	859	152	9	3,581
11.00-12.00	2,186	112	637	140	6	3,081
Total	76,234	37,024	21,036	4,224	13,821	152,339

but realizes unless intelligent regulation is adopted it will always be confronted with the very difficult problem of spacing its cars with such frequency and regularity as fully to meet the popular idea of adequate service.

Parked vehicles necessarily will force all moving traffic through about one-half the available width of the street, namely, in the car track area. Estimating 20 ft. per auto and 50 ft. per street car, the total linear space occupied during the p.m. rush hour (5 to 6 p.m.) by autos was 107,200 ft. and by street cars 96,300 ft. There was a vehicular movement every 3 second in addition to a street car movement every 1.8 seconds. If there were no parked vehicles much of this vehicular traffic would move parallel with the street cars and the result would be quicker movement and at the same time increased capacity for both classes of traffic.

The small chart within the large chart on page 76 illustrates the relation between street car movements and other vehicles during the peak hour.

In working out the traffic problems of this city the question must be studied from a physical standpoint and without regard to the feelings of the individual shopkeeper. It is evident that no one rule can be applied uniformly. During the rush hours there are certain natural arteries through which the heavy currents of traffic should be allowed to flow unobstructed by parked vehicles. There are other streets and portions of streets upon which parked vehicles would not in any way interfere with the free movement of travel. The local authorities realize that the time has arrived when more effective regulation must be had and they are at the present time engaged in working out a solution to this problem. It is believed that the plan finally decided upon will insure well ordered movement and consequent increased street capacity for all moving vehicles and will provide for future growth.

Experts from the Public Service Commission of New York who have completed a brief survey of trolley service in Buffalo, as a result of complaints made by municipal authorities, have recommended to the International the employment of additional traffic supervisors to see that cars are operated under normal headway instead of in groups as at present. In making the recommendation, Public Service Commissioner Pooley said the traffic experts find that a sufficient number of cars are in operation to provide adequate transportation but the railway should exert a greater effort to see that cars are spaced properly. The difficulty that has arisen in this respect is chargeable largely to effects of the strike that was declared by the trainmen last July.

New York, London, Paris and Berlin Transit Compared—I*

While Social and Other Conditions Greatly Affect City Transit Methods There Is Much that Can Be Learned from the Properties Abroad, Especially Methods of Merchandising Transportation—More Passengers Are Carried Annually on the City Systems of New York than on Those of Any Other City

By Daniel L. Turner
Consulting Engineer, New York Transit Commission

THE transit conditions in this country and in Europe are unlike physically, socially and psychologically. In comparing them, it is a matter of pointing out their contrasts. Generally, it is fair to say that municipal transportation has been developed farther here than abroad, but in some particulars, as we shall see, London and Paris lead us.

The painted platforms is one illustration of the psychological difference in conditions. attitude of the passengers toward the operators of the transit lines is different. Also, the mental attitude of the public authorities toward those responsible for the operation of the facilities is different. The passengers are more amenable to suggestion and control than they are here. They expect to have information furnished to them in such a way that they can conveniently use it. They seek out the information for themselves. and from our point of view, the strange part of it is that they endeavor to be guided by the directions given them. They are willing to do what they are told to do. On some of the London Underground station platforms, painted white lines were observed. They were guidelines within which the passengers were expected to form queues so that they might board the trains in the order in which they arrived at the station, and in an orderly manner. Without protest, the passengers formed up within these painted lines. Here we have to mark out such spaces with 2-in. pipe railings, and we have to have policemen on hand to compel the passengers to keep in formation behind the railings.

The practice which is very generally in vogue abroad of permitting passengers to open the car doors themselves, and to debark from the train before it has stopped, and also of opening doors and boarding trains after they have started, is an illustration of the difference in mental attitude of the public authorities over there and over here. If we permitted our companies so to equip the cars as to enable passengers to open the car doors and enter and leave the trains at their will, and injuries occurred, there would be a hue and cry about indicting the railroad officials and others responsible for permitting such a thing to happen. Over there, the rules are against the passenger leaving and entering the train while in motion. If he is injured under such circumstances, he-the passengeris to blame, and is held responsible, not the operators of the line. In other words, over there the fool is punished. Over here, those responsible for not making things foolproof are punished.

The difference in mental attitude may be well summed up in a statement made to me by one of the railroad officials, which was to the effect that their idea was to train the individual to use his head, and to do what he should do and when he ought to do it. He was speaking of training railroad operating men and was objecting to our tendency to develop all kinds of mechanical devices which automatically control the operations and take the responsibility out of the hands of the operatives themselves. In other words, their idea is that since we must always deal with the human element, we should train the human machine to be as perfect a human machine as possible, and require it to function and not destroy the efficiency of the human machine by taking all control away from it, and setting up a mechanical device in its place.

While I admire the principle, I am convinced it cannot be applied under our conditions. For example, the train crews must lock our train doors, and thereby stop most of the passengers, who could easily and safely do so, from getting on and off the trains as they please, in order to prevent the fools from getting on and off at the wrong time and in the wrong way. That is to say, with us, in municipal transportation, as well as in every other human activity, the liberty of action of the great majority must be restricted to safeguard the incompetents and fools.

SOCIAL CONDITIONS

When I first saw the red and gray and green toy towns on the banks of the Mersey as we approached Liverpool, and compared them in my mind with the skyline of upper Manhattan, I realized at once the outstanding difference in the social conditions over here and abroad. There were the home areas of a great city, consisting of two- or three-story garden homes, as compared with the ten- or fifteen-story family barracks of New York. Each little family had a separate little home. There were trees and shrubs in plenty. Compare such a picture with our conditions here in New York, where we house forty or fifty families under a single roof, in a barracks, for it is just that. And where there are no gardens, no shrubs and no trees. The same contrast prevails in the business parts of London, Paris and Berlin. In those cities the maximum height of the buildings is five or six stories; here, we have gone to forty stories and have not yet reached the limit. There, by restricting the building heights, they have compelled the diffusion and distribution of the home and business activities. Here we are superimposing six or eight cities on one and expect the circulating and distributing systems designed to serve the one city serve the six or eight cities.

^{*}Abstracted from the first part of a report just presented to the New York Transit Commission. Mr. Turner spent last summer in Europe studying city transit conditions. An abstract of the second part of Mr. Turner's report, comparing operating practice, will appear in a later Issue of this paper. The portion on buses is given in greater detail in Bus Transportation for January.

When they were told in London and Paris that we would build a subway, and then some one would come along and build a single building on a single block that would absorb one-third of the subway capacity, they were astonished. They have no such problem to contend with.

Average densities of population do not disclose these conditions. It is the concentration of living and business activities which intensifies and complicates the municipal transit problem. Paris has the greatest average population density, with 151 people per acre. This is nearly six times the average density of New York City and two and one-half times the density of London. Berlin comes next to Paris, with a density of 118 people per acre (municipal Berlin, I mean). Its density is four times that of New York and two times that of London, and London has a density of sixty people per acre, which is two times that of New York, with an average of twenty-eight per acre. But in Manhattan Borough of New York the population density is 163 per acre on the average, even greater than in Paris, and in some parts of New York the congestion of population is very great. Reduced to blocks, there is a single block within the most congested area, which had a population of 2,963 in 1920, or a net population of 1,650 people per acre; and the whole area in which this block was located, consisting of about 100 acres, had a population density of about 500 per acre.

There is no other place in the world except New York where a single business building during working hours has a resident population of 12,000 people. In this same building, the total number of people passing in and out a day was about 50,000, or measured in transit passengers coming and going, it amounted to 100,000 passengers that had to be carried to this one block and taken away during the day. In another part of the city, a single big shop is visited during the business day by approximately 60,000 people. Or, going to and from the building, transportation has to be provided for 120,000 passengers per day, again only in a portion of a single block. That is to say, more than the entire population of Albany, of the capital of the state, has to be transported on the transit facilities to and from a single shop every working day throughout the year, and this is only one such shop. Innumerable instances such as these might be cited.

We cannot compete against this kind of thing. Transit cannot be provided for such concentrated demands. Something must be done to compel a better distribution of our living activities. We must exercise a more drastic control over the height of buildings and our various community activities. We have our zoning laws, but they are not effective enough. The lid must be clamped down so that our population cannot grow up into the air. Then it will utilize the transit facilities and distribute itself over the whole city.

AREAS—CIRCUMSCRIBING RADII—POPULATIONS

New York, London, Paris and Berlin differ physically in many particulars. They differ not only in their populations and the size of the cities, but they differ with respect to the character of the transit facilities supplied for the accommodation of the people, the use made of the various types of facilities, and the manner in which they are operated in the public interest.

Each of these great cities has a municipal entity. In other words, there are central areas, municipally governed, which form the nucleii of great metropolitan

areas or greater cities. One cannot reasonably compare the municipality of New York with the greater cities of London, Paris and Berlin. Such comparisons as are made will either be comparisons between the municipally governed areas, that is, the cities of New York, London, Paris and Berlin, or between their metropolitan districts.

In area, New York is the greatest city of them all. In fact, these three great capitals of England and Europe all together only aggregate about 176 square miles, and are only a little more than half as large as New York City with its 315 square miles of area. London with its 117 square miles is just about the exact area of the Borough of Queens. Paris and Berlin, with their 30 and 29 square miles respectively, are only about 50 per cent larger than Manhattan Borough, or only about one-half the size of Richmond Borough. By Berlin is meant the old city as it existed as late as 1920. In that year a Greater Berlin was created.

Dealing with the metropolitan districts surrounding the great cities, Greater New York is assumed to mean the area included under the Port Authority control, the only legal entity now in existence. Greater London is the area under the control of the Metropolitan Police, and Greater Paris is the area within the Department of the Seine. Greater Berlin is assumed to be the area which was included within the city under the consolidation effected in 1920.

Even in comparing these greater cities, New York again stands out as being larger than any of the others. Greater London with its 693 square miles is only a little less than half of New York with its 1,463 square

TABLE I — MUNICIPAL FARE PASSENGERS IN MILLIONS, AND PERCENTAGE OF TOTAL TRAFFIC

Type Facilit	of y New York	London	Paris	Berlin
Trolley or tra	1,451— 59°; ninway. 978— 39°; 51— 2°;	551— 25°, 688— 32°, 932— 43°;	529— 46° ; 372— 33% 246— 21°;	60— 13% 390— 83% 21— 4%
Total	2.480-100%	2,171-100-	1,147-100%	471—100%

miles. Greater Paris with its 188 square miles is only a little more than one-tenth the size of Greater New York. Greater Berlin with its 339 square miles is about the same size as the New York City of today.

But the most important thing from the transit standpoint is not the area of these communities, but the radii which circumscribe them. This measures the distance which passengers have to be carried from the business center of the city to the outlying sections. New York City is a semi-circular city, whereas the three other cities, London, Paris and Berlin, are approximately circular cities. The greater area of New York as compared with those of the other cities is accentuated from the transit standpoint because of the fact that its area is included within a semicircle, while that of the others is included within a To reach the outermost limits of New York, circle. passengers have to be carried 20 mlles; that is, to outer Richmond. The outer limits of Manhattan are about 13 miles from the center; Brooklyn 11 miles; Bronx and Queens both 16 miles. The most populous part of London is the part north of the Thames, which is about double the density per acre of the area south of the Thames. The circumscribing radius of the area north of the Thames is only about 6 miles, and 10 miles will include all parts of the area south of the Thames. In other words, the greater part of London is not any further away from its business center than from City Hall to Eighty-first Street in Manhattan. The maximum distance away from the center is no further away than from City Hall to 190th Street in Manhattan. The outer limits of Paris are only 3 or 4 miles away from the center, or a distance of only from City Hall to Sixty-fifth Street at the most. In the case of Berlin, any point in old Berlin can be reached in a ride of a similar distance as from City Hall to Sixty-fifth Street.

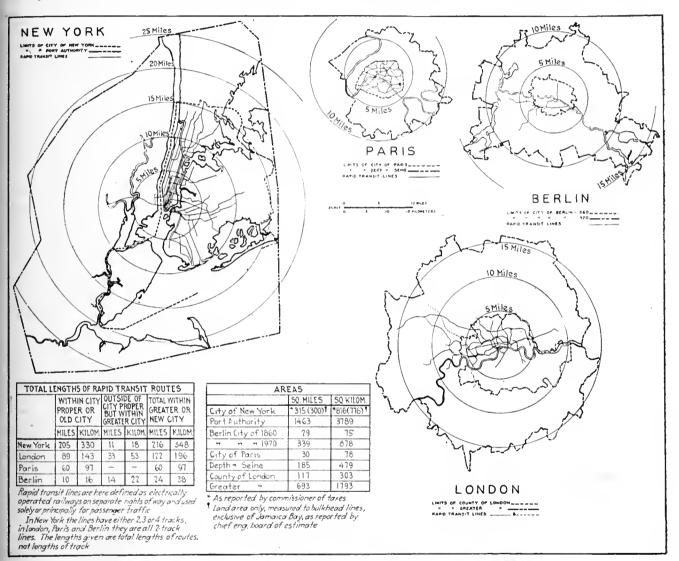
When we consider the "greater cities," they are all approximately circular in form, but the circumscribing radius of New York is 31 miles, London 16 miles, Paris 10 miles, and Berlin 16 miles. In fact, from the transit standpoint, to reach the outer limits, passengers have

mated at 8,000,000; Greater London. 7,476,000; Greater Paris, 4,500,000, and Greater Berlin, 3,804,000.

TYPES OF FACILITIES—TRAFFIC

There are three general types of municipal facilities in use in New York, London, Paris and Berlin. These are (1) the rapid transit lines, operating either underground, overhead, or along railroad rights-of-way, (2) the trolley or tramway lines and (3) the autobus lines. Then there is still a fourth class of facility, the suburban service over the steam trunk-line railroads. This service will be dealt with separately.

The best measure of the importance of any particular



Map of the Cities Considered, Drawn to the Same Scale and Showing Rapid Transit Lines

to be carried a greater distance in municipal New York City than they have to be carried to reach the outer limits of the greater cities of London, Paris or Berlin.

These limitations emphasize the relative simplicity, from a transit standpoint, of distributing the populations of London, Paris and Berlin, when compared with the problem of distributing New York's population to the outer limits of the city.

The population of municipal New York was 5,620,000 in 1920; London, 4,483,000 in 1921, 80 per cent of New York; Paris, 2,906,000, 52 per cent of New York, and Berlin, estimated at 2,200,000, or 40 per cent of New York. The population of Greater New York is esti-

type of facility is the traffic which it develops. Table I gives the traffic on the various types of municipal facilities in the four cities being considered.

The figures in this table do not include any steam railroad suburban traffic, nor are they intended to include any transit traffic in the extra areas of the several cities. They are only approximate figures for the cities themselves, that is, the municipal areas. They are only approximate for the reason that in London, Paris and Berlin the transit lines serving the municipal areas usually, in varying degrees, extend out into and serve in part the extra areas, so that the figures as they are available apply rather to the greater cities

than to the municipal areas. The municipal area figures have been deduced, therefore, from these general statistics, and while they are only very approximate, they are believed to represent a better comparison between the conditions in the several cities than can be obtained in any other way.

Instead of the figures given in Table I, if all of the transit traffic were included for the several metropolitan areas, the numbers with the percentages of distribution of the traffic would be as in Table II.

No figures are available for Greater New York since Greater New York includes the traffic figures for several counties in New York State and New Jersey, outside of the city, in which counties are included a number of cities of considerable size. The statistical information with respect to the transit facilities in this extra area not being available, the statistics for greater New York City cannot be compiled. The figures in Table II not only include the traffic on the rapid transit and tramway lines in the extra areas of the several cities, but they also include the approximate steam railroad suburban traffic. It is not intended to enlarge upon the suburban transit conditions at this Additional information from abroad is awaited before doing this. But generally it appears that the steam railroad traffic in Berlin is more important than that in any of the other cities. This Berlin traffic is the traffic that is carried on the Stadt-Bahn and Ring-Bahn systems, which are steam lines operated by the state, and over which the suburban railroads deliver their traffic into the heart of Berlin. This is one of the outstanding features of the Berlin transit system. and it will be considered more fully at another time.

RIDING HABIT

Based on the separation out of the municipal traffic for the municipal areas, it appears that London has the greatest number of rides per capita per year, 484, as compared with 435 for New York, 395 for Paris and 214 for Berlin.

If the total traffic (including the steam railroad traffic) and the greater city area are considered, then the rides per capita become 382 for Greater London, 357 for Greater Paris and 372 for Greater Berlin. There is no corresponding figure for Greater New York, but for New York City the figure is 454 rides per capita.

The fact that the riding habit in London is greater than in New York is a surprise. The figure for New York has heretofore been compared with that for Greater London—that is, New York's 435 compared with Greater London's 382.

TRAMWAYS

In Berlin the tramway system is relatively more important than in New York, London or Paris. This does not mean that the tramways in Berlin carried more passengers than in these other cities. The traffic in Berlin is only a little more than one-third of that carried in New York, about one-half of that carried in London, and only about the same as that in Paris. But 83 per cent of the total municipal traffic is tramway traffic. If the total traffic (including the steam railroad traffic) in Greater Berlin is considered, the tramways carried about 47 per cent of the total. Therefore, the tramways are the most important transit element in Berlin. In New York, London and Paris the tramways are about of equal importance in the transit scheme. In all three of these latter cities about one-third of the traffic is

carried on the tramway lines. Curiously enough, the tramway system of Paris carries the long-haul traffic from central Paris to points outside of the fortifications in extra Paris. In others words, the tramways, instead of the subway lines, are used for long-haul business in Paris.

In Berlin the tramways operate over the entire city and out into the greater city. In New York they operate throughout the entire city. But in London and in Paris there are small areas in the business center from which the tramway lines are excluded. In London this area is about 3 square miles, about 2 miles long by 1½ miles wide, and it is about the equivalent of Manhattan

TABLE II—TOTAL FARE PASSENGERS IN MILLIONS, AND PERCENTAGES OF TOTAL TRAFFIC

Municipal Greater Greater Greater Berlin

	New Y		London	Paris	Berlin
Rapid transit Trolleys or	1,451—	56%	588— 21%	529 33%	96— 7%
tramways	978— 51—	38% 2%	1,009— 35% 932— 33%	613— 38% 246— 15%	669— 47% 21— 2%
Steam railroad suburban		400	324 11%	218— 14%	630— 44%
Totals	2,586-	100%	2,853—100%	1,606-100%	1,416-100%

below Eighth Street. In Paris the area is only about three-fourths of a square mile in area, 1 mile long by mile wide, or only about one-fourth of the area in London. It is contended that in the business center, where the vehicular congestion is relatively very great, the tramway lines cause a serious interference with traffic. It was stated in Paris that the tendency was to exclude the tramways more and more from the center of the city, in order to relieve the traffic congestion on the streets. This is a principle with which I agree.

All of the tramways in Berlin have the overhead trolley, whereas in all of the other cities both underground and overhead trolleys are in use.

The tramway cars used in London are the exception as to type. They are all double-deck cars, and most of them with the upper deck closed in. All the tramway cars throughout England and Scotland run to this double-deck type. In contrast with this type, the single-deck type is used in New York, Paris and Berlin. The advantage of the double-deck type is that it enables a car to be developed with a maximum seating capacity and minimum weight of car per seat—even less weight than our one-man cars.

The use of trail cars in Europe, where the single-deck cars are in vogue, is very much more common than with us. Peak loads are taken care of by trains of surface ears, and trains with as many as three cars have often been noted.

The double-deck car is a very desirable type of car. It is a wonder that the type has not been utilized in this country. They have not been used in New York City because of the difficulty in developing a double-deck car that would travel under the elevated lines, where the clearance is limited.

BUSES

The importance of buses as a transit element is recognized in London and Paris, whereas, by contrast, their use is negligible in New York and Berlin. The bus system in London carries the largest number of passengers. The annual traffic amounts to 932,000,000 passengers. This is nearly four times as many as are carried in Paris, more than eighteen times as many as in New York, and more than forty-four times as many

as in Berlin. In London, 43 per cent of the total municipal traffic is carried on the buses. The bus system renders an excellent and most convenient service. It is the outstanding transit element in London. Because of the convenience of the facilities and of the cheap shorthaul fares, it is believed that the bus lines create their own traffic; that is, if the bus operation were stopped, possibly only a small part of the traffic would flow to the other transit lines, particularly when these lines are subway and elevated lines. The London bus system is the only transit facility which serves all of London. Only parts of the city are served by the tramways and by the rapid transit lines.

In the type of bus used, Paris is the exception. Its buses are all single deck, whereas in New York, London and Berlin they are all double deck of the same general type—that is with uncovered upper decks. Paris is developing a six-wheel bus which will carry forty-eight passengers—forty sitting and eight standing, but this is a very long bus and takes up a great deal of room in the street, although it is easily manipulated through the traffic by reason of the six-wheel design. The double-deck bus is preferable. It develops the maximum seating capacity for the minimum space occupied in the street.

RAPID TRANSIT LINES

New York has a larger rapid transit traffic than London, Paris and Berlin all together. Fifty-nine per cent of all of the transit traffic is carried on the rapid transit lines. The rapid transit lines—or subway and elevated lines—are by far the most important of all the transit facilities of New York City. In Paris also, the rapid transit lines are the most important transit element. But the New York rapid transit system carries nearly three times as many passengers as are carried on the Paris system. The Paris and London systems carry about the same number of passengers, but the rapid transit system of London is the least important transit factor. In Berlin the rapid transit facilities are relatively unimportant. New York carries about twenty-four times as many passengers as are carried on the Berlin system.

New York, Paris and Berlin all have a shallow type of subway construction, and all have elevated lines. London, on the other hand, has no elevated lines. Although it has some shallow underground construction, its underground lines are mostly deep-level tube lines, from 20 to 193 ft. below the surface. London also has rapid transit lines constructed on the ordinary steam railroad rights-of-way; that is, so-called surface lines running in cut and on embankment. The sub-surface conditions in London-the London clay-has favored the construction of its deep tube lines; but these deep tubes do not furnish as convenient transit facilities as the shallow subways. Short stairways provide access to the shallow subway lines, whereas elevators or escalators are necessary in the case of the deep level lines. The time consumed in traveling from the surface to the station platform on the London underground system greatly detracts from its convenience. All of these lines are two-track lines. No great effort has been made to make the structure ornamental, although on the newer lines the stations are plainly finished in tile. The stations are approximately 3,200 ft. apart on the average, about 50 per cent greater distance apart than the average stations in New York.

The exceptional feature of the New York rapid transit system is its four-track express lines. The sys-

tems in London, Paris and Berlin are all two-track lines, and provide for no express operation except such as can be obtained by skipping stations when the intervals between the trains will permit it.

In London, the Inner Circle Loop is the most interesting feature of its rapid transit system. Most of the tube lines operate independently. That is, the trains operating on each particular line do not operate on the tracks of any other line; but the Metropolitan District and the Metropolitan companies operate a joint service on a circular route known as the Inner Circle. The route is irregularly elliptical, about 5 miles long by 2 miles wide at its widest portion. Neither Paris nor Berlin has a circular route of just this kind. Paris has two circular lines but no routes which operate completely around these circles, and Berlin has one, a steam line, but two routes operate a shuttle service over it. So the Inner Circle route is a route peculiar to London alone. The through routing of rapid transit trains over the steam railroad lines and then over the rapid transit tracks is another interesting feature of the London rapid transit system.

The Paris subway system is not really a rapid transit system in the sense of providing quick transit for long rides. It is made up of short independent routes which intersect and afford a free transfer to each other, thereby providing a convenient and relatively short-haul underground transit system. It is a short-haul system because the longest ride from the center does not exceed the distance from City Hall in Manhattan to Forty-second Street. The Paris subway system is admirable for its purpose.

The feature of the Berlin rapid transit system, or subway and elevated system, is the large amount of shuttle service that is operated. Practically 50 per cent of the total route mileage is served by shuttle trains only. The service probably accommodates the traffic or the needs of the community, otherwise the public would not permit it to continue. The rapid transit lines in Berlin are all two-track lines, as in London and Paris. Stations are about 2,500 ft. apart.

The maximum train length in Paris is five cars. In London and Berlin it is six cars, except that there are a few eight-car trains in London. In New York it is ten cars. So that the rapid transit systems abroad are only utilized to about half of their potential capacity gaged by what we do in New York.

We need in New York a circular route similar to the Inner Circle Loop in London to articulate our radial lines together. With the completion of the proposed Brooklyn crosstown line such a route will be obtained. We also need to profit by the idea of direct routing which obtains in the Paris subway system, and not continue the policy of routing too many different kinds of trains over the same tracks. That is, we should not require trains to interchange from one line to another. Instead, we should require the passengers to change or transfer.

EFFICIENCY OF TRANSIT DEVELOPMENTS

On the theory that every citizen should not be more than ½ mile away from a rapid transit line, or ½ mile from a surface line, wherever he may live, to be conveniently served by such facilities, New York requires about 500 route-miles of rapid transit lines and about 1,000 route-miles of tramway and bus lines together. It has 205 rapid transit route-miles and 637 surface line route-miles—mostly trolley lines, but a few bus

lines—in other words, New York's rapid transit system has been developed to only about 41 per cent efficiency and its surface system to only about 65 per cent efficiency.

From the same convenience standpoint, municipal London should have 185 route-miles of rapid transit lines instead of the 89 now serving it. Or its rapid transit facilities have been developed to about 48 per cent of its requirements. The surface facilities conveniently to serve London should amount to about 370 route-miles. It has 408 route-miles of tramway and bus lines all together, which means that its surface system is 10 per cent more than it requires from a convenience standpoint.

Paris only needed about 50 route-miles of rapid transit lines conveniently to serve its area. It has 63 route-miles or 26 per cent more than it needed. In the case of the surface system, it needed about 100 route-miles of tramway and bus lines. It has 259 route-miles, or it has 159 per cent more surface facilities than required.

Berlin theoretically requires 45 route-miles of rapid transit lines and has 10. So it only has been developed to 24 per cent of its requirements. It needs 90 route-miles of surface lines and has 125 route-miles, so it has 37 per cent more surface facilities than it requires, all from a convenience standpoint.

The convenience standpoint is the first requirement to be satisfied. But later on the capacity requirement must be satisfied also. As the population of a city increases, the capacity requirement becomes the factor controlling its transit development. For example, capacity instead of convenience now controls the transit requirements in Paris on both its surface and rapid transit systems. In New York, the transit requirements in the central part of the city are determined by capacity. In the outlying sections, we have not arrived anywhere near a convenience standard of development up to the present time.

MAPS AND DIRECTION SIGNS

In London and Paris a great many maps and direction signs are used with good results. This information is placed on the station platforms of the rapid transit lines and also in the cars, and it is placed in the cars of the tramway lines and in the buses. In London small pocket maps giving detailed information about the rapid transit lines and tramway lines and bus lines are furnished freely to all passengers who request them. In Paris the same kind of maps are furnished for the tramway lines and the bus lines. In London and Paris, in providing information to the passengers, the management seems to start with the theory that the passengers know absolutely nothing about the transit systems, and the maps and signs and other information are prepared and located accordingly. This is particularly the case in Paris, where it is almost impossible for a passenger to go astray, whether he knows the language or not. This is what makes the Parls subway system the most convenient subway system in existence from a passenger standpoint. In New York, on the other hand, the management seems to start with the theory that the passengers know all about the transit system, and only such information is furnished the passengers as cannot be avoided.

The railways in New York could greatly benefit the public by adopting the policy of giving information to the passengers, in vogue in London and Paris. In other words, we can sell the transit service to the public as they do—to advantage.

Except on the Fifth Avenue bus line, all transit facilities in New York, the subway, elevated and trolley lines, furnish an all-night service. On the other hand, in London and Paris, the transit lines only operate about nineteen or twenty hours. Service is suspended on all the transit lines from shortly after midnight until the workers begin to travel in the early morning. What would happen if we should suspend the all-night service in New York?

Crossing Signal for Infrequently Used Spur Track

AT ONE POINT on San Pedro Street in Los Angeles a steam railroad spur track crosses the double-track interurban line of the Pacific Electric Railway. Heretofore the city has required a safety stop to be made at this crossing by the interurban cars, but per-



Simple Signal Device Safeguards Operation at Infrequently Used Railroad Spur Crossing

mission was recently granted for the discontinuance of this stop if a gate was provided. The spur, however, is located in an alley much used by motor trucks in delivering and receiving products to and from establishments located along it. A gate, therefore, without proper flagging would have hampered the movements of the trucks. A signal device was therefore designed, constructed in the engineering department's signal shop and installed to furnish the desired protection without hampering trucking movements. One of the company's ordinary standard switch stands, with lock, was utilized, the stand being anchored to bolts set in

the curb and the sidewalk. The stand was extended by means of a pipe to a height of about 15 ft. and held in a vertical position by means of bearings clamped to a steel trolley pole. Near the upper end a bracket-supported arm about 6 ft. long was attached to carry the signal.

For day indication a large red sign with the warning "Stop" lettered on it was fastened to one end of the arm, and a 220-volt carbon-filament lamp, carried in a metal shield, was mounted on the arm for night indication. The lamp was placed between two red lenses. A 1,000-ohm resistance tube was connected in series with the 220-volt lamp to permit it to be used on the trolley circuit. This tube was placed in a hox supported on the pole. The clearance under the stop current is about 14 ft.

The usual position of the signal is across the alley, as shown in the illustration. It sets in this position while interurban trains are being operated over the railroad crossing, but when the industrial spur is being operated by the railroad the signal is swung around and projects into San Pedro Street. It thus serves as a warning to interurban trains that switching is going on over the spur. The general construction of the signal is shown in the accompanying engraving.

New Cars for East Boston Tunnel

Boston Elevated Railway Develops Car for Rapid Transit Service, Weighing with Motor Equipment Only About 1,000 Lb. per Passenger Seat or 250 Lb. per Passenger on the Basis of Total Rated Carrying Capacity

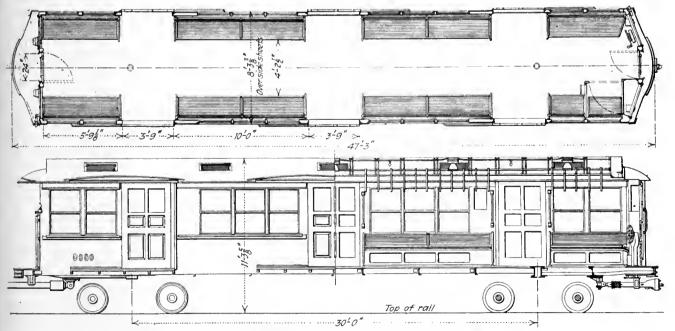
HE Boston Elevated Railway supplies transportation between Boston and East Boston through a tunnel under a branch of the harbor at the point where the Charles River empties into it. The entire length of the tunnel from Bowdoin Square, the western or Boston terminal, to Maverick Square, the eastern or East Boston terminal, is 1.49 miles. Between these terminals there are three additional stations on the Boston side of the harbor. When this tunnel was first put into use it extended from Court underground station, on the Boston side, to Maverick Square on the East Boston side, where the cars came to the surface and continued on, over the several routes, to their destination. In later years the tunnel was extended, on the Boston end, to its present underground terminal at Bowdoin Square.

For a number of years single-car operation was maintained over this line, but as traffic increased two-car trains and ultimately three-car trains, consisting of center-entrance multiple-unit surface cars, were resorted to during the rush hours. This service is still in operation, but the capacity of the tunnel has been reached. Therefore, to take care of the constantly increasing population, the company has decided to substitute cars of the rapid transit type to be operated in trains, thus obtaining greater tunnel capacity, as well as greater capacity per car and per train, more rapid service and lower cost for platform labor per passenger. It was found to be impossible to use, for the tunnel service, the type of car used in the Cambridge Subway or on the company's elevated system, because of limitations in tunnel clearances, platform heights, etc. Consequently a new car was designed to be of all-steel construction with brass sashes.

At the present time an underground station is in process of construction at Maverick Square, into which, when completed, the surface cars serving the East Boston district will enter and discharge passengers onto a platform, from the opposite side of which the passengers will board the rapid transit trains and continue through the tunnel to the several stations on the Boston side of the harbor. After discharging passengers the surface cars will be operated, empty, around a loop to a loading platform, where they will receive passengers from the rapid transit trains and then continue out to the surface and over their several routes to their destination.

As the new tunnel cars will never inter-couple with any other type of car on the system, the railway had great latitude in the design of the car and its equipment, although it was limited as to length, height and width of car. Under these conditions a car has been designed which will provide for forty-four seated passengers and

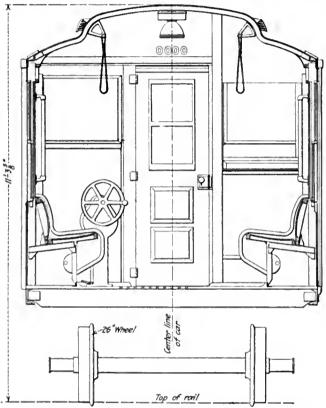
STATISTICS FOR EAST BOSTON TUNNEL CARS
Length over all
Width over all
Height from top of rail to top of roof
Width outside sills 38 In.
Width over all 8 It. 7 In.
Width of side doors 3 ft. 9 in.
Diameter of wheels
Seated passengers (with eab open)
Seated passengers (with cab closed)44
Standing passengers (with eab open)
Standing passengers (with cab closed)
SashesBrass
Roof
Ventilators
Electric door engines
Speed control brake
Motors 4 GE-247
Controller
Car strapsRieo
Manufacturers
Number of cars
Minner of care it



Cars Being Built for the East Boston Tunnel Service of the Boston Elevated Railway

136 standing passengers in all but the forward car in the train. This car, on account of the cab being occupied by the motorman, will have two less seated passengers and standing area for two less passengers than given above. The total passenger capacity in the first case will be 180 per car and in the second 176, and has been obtained with an estimated weight on the rail of 44,000 lb. per car.

It has been found by the engineers of the railway that a reduction in car-body weight means an equal or greater possible weight reduction in truck, motor and other equipment, as their experience indicates that with every 1,000 lb. added to the car body, about 1,200 lb.



Cross-Section of East Boston Car at Motorman's Cab End

must be added to the truck and equipment. This ratio is not always correct for the reason that there is considerable difference in the steps of standard motor capacities.

In the study of the design of this car it was evident that if sufficient weight could be eliminated in the body and its equipment, a smaller capacity, and consequently a lighter motor, with a proportionate saving in trucks, air brake and control equipment weights, could be used. With this in view the idea of operating two cars, semi-permanently connected together, as a single unit, was evolved. This arrangement, it will be seen, requires an operating cab on the ends only of the two-car unit, eliminating the necessity of a cab in each end of each car, saving the weight of the material entering into the construction of the cab, also the weight of one set of air brake, control, and miscellaneous cab apparatus with its piping, wiring, etc. The estimated saving in the above arrangement is approximately 1,200 lb. per car.

With the two-car unit arrangement a train will consist of two, four or six cars. Each unit will be controlled by a single guard as on the present rapid transit cars.

A considerable reduction in weight has been obtained

by the use of what is known as "truss-plate" flooring. This consists of two steel plates, each having depressions regularly spaced. The plates are placed together so that the convex surfaces of the depressions come in contact and are then spot-welded, resulting in a single "truss-plate" of \(\frac{7}{4} \)-in. thickness and an insulating air space between the plates of approximately \(\frac{1}{8} \) in. The "truss-plate" will be covered with a mastic floor compound to a thickness of \(\frac{7}{8} \) in. The total weight of this floor will be approximately 4 lb. per sq.ft., whereas the flooring in the present rapid transit cars in Boston weighs from 9 to 14 lb. per sq.ft.

A further reduction in weight was obtained by the use of copper-covered, soft pine or balsam wood doors, arranged to slide on the exterior of the car, thus eliminating the double wall at door pockets, and reducing the thickness of the side posts and walls of the car. The weight of the doors is 50 per cent less than that of the doors on the latest Boston rapid transit cars.

One of the interesting features of this car is that each side door will have its own motor-driven actuating mechanism, which will be placed under the seat inside of car and will have a shaft extending through the side of the car to which the door-actuating lever is attached. These mechanisms will be controlled from the guard's position, between the two cars, by means of a controlling switch for each door mechanism. Whereas no saving in weight is expected from this feature, it is believed it will be less necessary to keep heat on cars, when stored in the open in cold weather, which the Boston men consider necessary with pneumatic door-operating mechanism, to prevent sluggish action.

Some question has been raised as to the possibility of keeping the outside doors weathertight, but from the experience the railway has had for several years on its surface cars, the engineers have no fear from this feature, in the event that, at a later date, the service will be extended and the cars operated on the surface.

On account of limited height of the tunnel, it was found necessary to make the distance from the rail to the top of car floor somewhat less than on the present rapid transit cars. This in turn necessitated the use of a 26-in. diameter wheel in place of 31-in. and 34-in. wheels at present used on rapid transit cars. Some saving in weight is thus made.

Another reduction in weight is brought about in the drawbar equipment in that the link or drawbar, connecting the two cars of each unit, is somewhat lighter than the regular drawbar with its electric couplers which will be used at the ends of each unit.

Each ear will be equipped with swinging end doors, thus eliminating the weight of the door pocket partition, located as usual in the rapid transit type of ear, but these will not be used by passengers, except in case of emergency.

These cars will be equipped with the Westinghouse variable load brake, which has recently been described in these pages. In tunnel service the distance apart at which the blocks can be set depends upon the distance in which cars can be stopped, so that there is special reason in the East Boston cars for an automatic brake which will increase or decrease the braking pressure according to the increase or decrease of the load, thus always providing minimum stopping distance.

The cars are lighted with a single row of five units in the center of the ceiling and each electrolier has a shade. There is also provision for emergency lighting.

Buses Could Not Fill Place of Street Cars in New York City*

The Bus Is Not Well Adapted to Mass Transportation Because of Its Small Overload Capacity—The Cost of Bus Operation per Passenger, Exclusive of Pavement Wear, Is Higher Than That of the Street Car—Data on Speed Are Also Given

By John A. Becler Consulting Engineer, New York

N ANY consideration of the possibility of supplanting the present street-car service in New York City with an equivalent bus service, the principal factors are the following: (1) Adequacy, (2) first cost, (3) cost of operation, (4) effects on public.

It is necessary to consider adequacy on an all-year basis. No one would think of operating open street cars through the winter, and similarly the double-deck open-top type of bus employed on Fifth Avenue cannot be depended on for its full seating capacity in mass transportation throughout the year. Observations at Thirty-third, Forty-second and Fifty-seventh Streets of the number of passengers and seats of the Fifth Avenue buses in each direction between 7 a.m. and 7 p.m., taken Dec. 15, 1921, show only a small percentage of seats occupied. At Fifty-seventh Street, the maximum load point, during the evening rush hour when the city's transportation systems are taxed to the utmost, only 65 per cent of the available seats on the outbound buses are occupied. The observations were taken on a fine clear day with an average temperature of 26 deg. F.

To inclose the upper deck of this type of bus would render the vehicle topheavy and increase the liability to accident. It would also reduce the clearance beneath the Elevated and other overhead obstructions. The single-deck type, seating approximately thirty passengers, seems best adapted to the general requirements in New York City.

The bus presents certain opportunities for obtaining greater mobility of service than the street car. It can load at the curb, and in blockades or breakdowns can run around the obstruction. It can be short-lined readily at any desired point and entirely rerouted on short notice in emergencies.

In capacity, however, the bus is less elastic than the street car, a factor of great importance in handling rush-hour crowds. Operating over steel rails in a fixed path, the latter is not only capable of smoother operation but can with safety and economy be built larger. The bus, weaving in and out of traffic and operating over pavements, the best of which have irregularities, is subject to lurching and abrupt movements that should limit its capacity to one passenger per seat. The average car can provide readily for as many as four standing passengers to each five seated during the maximum load period, and there is flexibility in the application of such a standard.

When the rush-hour demands are greatly in excess of the base, as in all large cities, this difference of capacities puts a considerable handicap on the bus, and undoubtedly has much to do with the fact that no important city as yet is served solely by buses. Where

they are used in conjunction with other transportation means it is noticeable that the rush demands on the latter must take care of the passengers who cannot be accommodated by the buses.

The surface lines in Manhattan now operate during the base 561 cars with an average seating capacity of 42, and in the rush periods of 1,002 cars. To carry the same number of passengers on the basis of service stated above would require 786 buses in the base and 2,538 during rush hours. To allow for repairs, etc., 15 per cent should be added, bringing the total buses required up to 2,919. The surface car traffic of all lines in New York City is about $2\frac{1}{2}$ times that of the Manhattan lines. Applying this factor 7,297 buses would be required to handle the traffic now carried on the surface lines in the city. Based on the above estimate the outlay for the installation of a complete bus system, including garage and shop facilities, would be, at the rate of \$7,500 per bus, \$54,727,500.

The car lines are already in use, and the tracks are in the streets. They have a value which is being determined by the commission. To remove them and restore the paving of the streets will cost millions of dollars. While it does not directly affect this estimate, the question remains as to who would bear the cost of such a change. Undoubtedly it would be borne by the public in one form or another.

Looked at in a broad way, the cost of service includes the total expenditure, whether paid directly by the operating company or indirectly by the public. Although the bus system has the smaller installation cost, the major portion of the difference is that the railway must provide and maintain its roadbed, track and paving. With buses the expense for these items is, as a rule, borne by the taxpayers; but it is none the less an important item in the cost of the service and for a true comparison must be included. Another important factor in determining the cost of service is the relative life of plant and equipment. The bus has a life of one-third that of a street car, or even less.

For the purpose of determining as accurately as may be the cost of bus operation the available statistics from operation of buses in New York, London, Chicago, Detroit and other localities have been analyzed. They are presented on a bus-mile basis in Table I. In this comparison only the two-man type of operation will be considered, for where the one-man bus is applicable the one-man car can be used equally well. Table I shows that the total cost of service, averaged from the American companies operating two-man buses, is 41.5 cents per bus-mile, exclusive of wear and tear on paving.†

^{*}Abstract of report to New York Transit Commission.

[†]In the Atlantic Monthly for August, 1921, this item is estimated by Philip Cabot to be about 10 cents per ton-mile,

	TABLE 1 -COMPARATIVE BUS OPERATING COSTS-CENTS PER BUS-MILE												
.~	Fifth Ave. Coach Co. N. Y. C.	London General Ombibus Co.	Detrait Mator Bus Co.	Chicago Motor Bus Co.	Goodyear Heighta Motor Bus Line	Municipal Ry. Busea, San Fran- eisco	Connecticut Valley St. Ry. Buses	Winnipeg Electric Ry. Bunes	Baltimore Transit Co.	Motor Transit Co., Los Angeles	Western Motor Transp. Co., Oakland	Tacoma-Olympia Stage Line	Wahington (D. C.) Rapid Transit Co.
Number of buses	* 271		28	40	12	5	3	7	20			7	14
Fires Repairs Gas and oil Conducting transportation.	0.98 4.61 23 23	10 40	2.71 24.94	10,46 3,97 14,81	5.10 7.40 5.80 10.21	5 50 6 53 3 14 6 75	3.88 6.53	1.48 4.73 5.90 8.12	6.50	3.06 3.83 2.63 3.77	3.50 4.70 3.00 3.50	1.82 0.43 2.36 3.98	1,72 1,10 2.67 6,23
Fraffic	0.16 1.62	2 10	0_35 4.14	5.42		- * *		0.47	3.54	6.93	3.00	2.78	0.36
Injuries and damages Insurance Maintenance and supplies	1.35		0.91		1,31	0.28	1,13	1.03			1.00	0.57	0.99
Rent	٠	11 70			0,42			0.53			1,50		0.48
Total expense (operating) Taxes Depreciation Fixed charges	33.12 4.66 a2.42 0.97	37.30 1.70 0.61	33 05 60.16 3.90 0.39	34.66 2.43 3.20 1.39	30.24 5.62 1.26	24.20 1.72	16.54 0.40 8.00 0.89	22.26 0.23 2.28 0.91	25.94 1.39 6.59 3.86	20, 22	3.00	11.94 0,15 4,30 1,03	16.92 0.28 2.61 0.35
Total cost per hus-mile	41, 17	39,61	37.50	41.68	37.12	25.92	25,83	25.68	37.78			17.42	20.16

Two-man operation.
 a Additional depreciation in adjustment account.
 b Does not include taxes.

In New York the cost of street-car operation is exceptionally high. The adoption of modern and efficient methods of operation should reduce this materially. An average of the cost of service, including taxes and interest, for street railways in the United States, as shown in Table II, is 45.7 cents per car-mile.

The greater capacity of the street car makes each car-mile operated in base hour service equivalent to 1.4 bus-miles, and each rush hour car-mile equivalent to 2.53 bus-miles, making a weighted average of 1.81 bus-miles to each car-mile over the day. One car-mile costing 45.7 cents is, therefore, the equivalent of 1.81 bus-miles costing 75.1 cents. Hence the cost of bus service, not including the indirect costs mentioned above, is approximately 65 per cent greater than the average cost of street railway service.

EFFECTS ON THE PUBLIC

A seat per passenger at all times is an attractive feature of bus service except that it sometimes involves waiting. To secure efficient operation it is necessary to fill all the seats during periods of heavy traffic. Consequently at such times there must be a surplus of passengers waiting, reservoir-like, along the route to do this.

In other ways the relative merits of the bus and street-car service depend largely on the territory served. In sparsely settled sections the smaller capacity of the bus is no disadvantage and may even result in greater frequency of service. In many localities, especially where car lines as yet do not exist, the bus may be much more economical on account of the smaller investment.

In congested districts frequency of headway presents

a different problem. Concentration of passengers is here advantageous. For instance, in the heaviest half hour of the afternoon eighty-eight buses on Fifth Avenue passed Fifty-seventh Street northbound carrying 2,828 passengers. This was at the rate of nearly three buses per minute with an average load of thirty-two passengers. With the same number of street cars 6,688 passengers could have been carried. To accommodate this latter number on buses more than seven per minute would be necessary.

At present the buses on Fifth Avenue represent 15 per cent of the total number of vehicles in the street. On account of their size and frequency of stops they are responsible for a great deal more than 15 per cent of the congestion, however. To increase the rate to seven buses per minute would, with the traffic interferences at intersecting streets, cause an intolerable congestion. Indeed, it is highly questionable if they could receive and discharge their passengers and move through the streets.

In referring to Fifth Avenue it is for the purpose of illustration only. Upon it operates America's largest bus line. The double-deck type of bus used there is admirably suited to the unusual traffic demands, which are largely a combination of travel for shopping and sight-seeing in fair weather, though hauling many regular patrons to and from business.

OTHER STATISTICS IN MR. BEELER'S REPORT

In addition to the tables shown, Mr. Beeler's report contained a number of other tables. One showed that at Fifth Avenue and Fifty-seventh Street on Dec. 15, 1921, from 7 a.m. to 7 p.m. from 7 to 25 per cent of the total vehicular traffic on Fifth Avenue is buses, the

TABLE II—COMPOSITE OPERATING REPORT
OF FIFTY-TWO AMERICAN CITY STREET
RAILWAYS, SIX MONTHS ENDED
IIINE 30 1921

JU.	NE 30, 1921		
Item	Cent	a Per Car-Mi	le
Operating revenue Operating expenses Eaxes		46.5 35 0 3 2	
Interest and other revideductions	rnur	7 5	
Total cont		43 7	

TABLE III-CHICAGO BUS SPEED DATA Observations of Chicago Motor Bus Com-pany's buses between north terminals and down-

town	return	atreets,	made	Oct.	19 and 20, 1921.
Hours Miles	to				8.11 bus-bours
Stops.					. 284
AVETA	ge runn	ing speed	1		. 10.70 m.p.h.
Avera	ge time	ber of atop) ў м		. 3.26 per mlle . 11.74 seconds

TABLE IV-COMPARATIVE STREET CAR SPEEDS

	M.P.II.
Pittsburgh	9.42
Ituffalo	9,93
Cincinnati	9 93
Philadelphia (Surface Lines)	10.00
Milwaukee	10.12
Detroit San Francisco (United Railroads)	10.13
San Francisco (United Italiroada)	10.19
Washington, D. C	10.21
Boston (Surface Lines)	10.50
Cleveland	10.64
In Loop District 6.21	10,64
Outside of Loop District 11,63	
St. Louis	10.90

average for the full twelve-hour period being 15 per cent.

Another table showed the average speed of the Fifth Avenue buses in various sections along the route and for different periods of the day. To one familiar with the territory, the speed attained in the different sections is comparable with the congestion encountered. The speed between Washington Square and Twenty-third Street averaged between 7.5 and 8 m.p.h.; in the section between Thirty-first and Forty-second Streets it was less than 4.5 m.p.h.; between Forty-second and Fifty-seventh Streets, it varied from 6.9 m.p.h. in the morning rush to 4.9 m.p.h. in the evening rush. The speed north of Fifty-seventh Street is greater than in any other section. This territory is very favorable for fast operation, there being long distances with few or no intersecting street crossings.

Another table showed the speeds of Fifth Avenue buses for the various routes at different periods of the day, the average for the system being 8.37 m.p.h.

There were several tables of speeds of buses operated by the Chicago Motor Bus Company. In the Chicago Loop District the average over various periods of the day was 5.81 m.p.h. Outside the Loop District the average speed throughout the day was 11.87 m.p.h. In this section, however, the stops average only 2.5 per mile, and much of the territory is through parks and boulevards where there are few intersecting streets. A composite of this information is given in Table III. In this connection it is interesting to note that the average speed of all the Chicago surface cars, as shown in Table IV, is 10.64 m.p.h. or practically the same as for the buses, while that of lines operating in sections similar to the bus territory is very much higher.

Another table compares the speeds of the buses operated in New York and in Chicago. The general average of 8.37 in New York is comparable to 10.70 in Chicago. The difference in speed is 2.33 m.p.h., or 28 per cent faster in Chicago.

Table IV compares the speed, between terminals, attained by the surface street cars in twelve of the largest cities in the United States. All of these speeds apply only to cars operated in city service. In several cities where a company operates both city and interurban service, the interurban cars have been omitted.

According to another table the number of buses per hour operated by the Fifth Avenue Coach Company below Fifty-seventh Street during the mid-day is increased only 80 per cent during the rush hours. The table also shows that to care for the company's proportional amount of the rush-hour traffic, as would be necessary were the buses to supplant the street car system, the number of buses operated in the rush hour would have to be 223 per cent more than during the base hour service.

According to another table on Fifth Avenue bus service, between 8:15 and 9:15 a.m. at Fifty-seventh Street, only 52 per cent of the seats are filled. The all-day average shows the proportion of seats occupied to be 37 per cent at Fifty-seventh Street, 35 per cent at Forty-second Street, and 21 per cent at Thirty-third S'reet. The general average at these locations shows that 31 per cent of the seats furnished are occupied, which means an average load at these points of 15 passengers per bus. In northbound traffic the average percentage of seats occupied between 7 a.m. and 7 p.m. was 25 at Thirty-third Street, 35 at Forty-second Street, and 33 at Fifty-seventh Street. The general average

of these locations is 31 per cent or the same as that southbound. Between 5:15 and 6:15 p.m., the hour of heaviest traffic northbound, 176 buses carried 5,580 passengers at Fifty-seventh Street. This is about the number that the subway carries in seven minutes on one track and at a much higher speed. Other tables give estimates of the cost of bus and electric car operation as contributed to the ELECTRIC RAILWAY JOURNAL by Messrs, Thirlwall, Simmon, Jackson and Stocks.

The Readers' Forum

European and American Trackwork Practice Compared

EDGAR ALLEN & COMPANY, LTD.
Imperial Steel Works, Tramway Department

SHEFFIELD, ENGLAND, Dec. 11, 1922.

To the Editors:

As I looked over recent issues of the ELECTRIC RAIL-WAY JOURNAL, which are always interesting, several of the articles suggested comment, which may be of interest to you. I noticed in particular the following:

In your issue of Sept. 16 there was an article on the relaying of rails in Washington, in which attention was drawn to a novel feature, namely, the pre-welding of six or seven rails together before they were put into place. This certainly has never been done over here, where space is a greater consideration than in Washington, due to the character of our streets, which do not lend themselves to much of this work. In the same issue is an article on the new British standard rail. which is a fair résumé of the specifications. The writer of the article, however, is in error when he states that a 1-in. space is left between the joints. He gives a diagram which refers to the No. 9 rail for open track. It certainly would have been better had a diagram been given in the specifications for paved tracks, as any one may easily fall into the same error.

The article on French rail sections, in the same issue, is an interesting résumé regarding French standard rails with flat treads, as abstracted from M. Gagné's paper published in full in the Industrie des Tramways. Your critique, further, gives details of special manganese rails for curves as used in Paris. There is no doubt that long experience has proved the value of the manganese-steel curve, but the question of first cost prevents its adoption in many cases. English engineers are divided on this matter. Some adopt manganese rail on curves, using the same sections for both rails. there being very little raised-groove rails used in this country except on junction work. Separate guards are largely used here, and if they are properly fitted and of a suitable type, the maintenance costs are not materially increased and are trifling compared with the advantages gained.

Various types of separate guards are used, including flat bars of ordinary steel and manganese bars of varying depths, but the most efficient has been found to be the Holt patent guard rail rolled in manganese steel. Actual experience has proved that this guard rail will outlive the ordinary rail without having to be turned, and as this section is reversible there is practically unlimited life. This guard saves the use of manganese rail for one rail, thus materially reducing the first cost and adding 70 to 100 per cent extra life to both rails,

as the guard rail will delay very considerably the erosion on the running edge of the rail.

With regard to switches, double tongue points are chiefly used on the Continent, while in this country the double tongue point runs a race with switch and mate. Tramway engineers are divided as to the relative advantages of these.

The article by Charles S. Holcomb in the issue for Sept. 23 is very comprehensive and will repay careful study by all interested in this subject. It suggests comparisons with certain features of English track as follows:

1. Referring to Mr. Holcomb's Fig. 2, page 446, the



Layout of Special Trackwork, Laid with Hol(Guard Rolled in Manganese Steel

9-in. rail is never used here, but the guard shown in this figure was used for a time. However, the Board of Trade refused permission for the raised lip to be used in the streets and several jobs had to be altered.

- 2. The tie bars used in England are 2 in. x $\sqrt{6}$ in. and 2 in. x $\frac{1}{2}$ in. as compared with the 2-in. x $\frac{1}{2}$ -in. bars used in Chicago.
- 3. The worn sections of rails, shown on page 449, are comparable with results in England, but No. 9 is a marvelous section to have carried traffic up to that stage. No doubt the extra metal under the back of the head was of material assistance.
- 4. The table of life for special trackwork, on page 451, clearly gives first place to type B, solid manganese, when the contributory remarks are taken into consideration. Recently I came across a case where a solid manganese junction was laid in 1908, the layout being altered in 1913 when C type was laid, with the result that the layout would represent half B and half C. The whole junction is now to be relaid, which proves that type B is much the better type for junctions where there is much traffic.
 - 5. As to flange-bearing trackwork, there is no doubt

that many of the original plates of the type used in the C construction were too short, as indicated by this article. The general practice "on this side," when British standard rails having a groove depth of 1½ in. are used, is to raise the center at intersections to a depth of ½ in., thus leaving § in. for the slope. According to the angle of the crossing, this runs from one in fifteen to one in twenty-four.

FRED BLAND.

Member Engineering Standards Committee and Light Railway & Tramway Association, and Fellow of the Permanent Way Institute.

Specifying the Sizes of Stranded Conductors THE OKONITE COMPANY

New York, N. Y., Jan. 3, 1923.

To the Editors:

Referring to the editorial in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 23, 1922, entitled "How Shall Stranded Wire or Cable Be Specified," please note the following:

It is an almost universal practice for engineers when calling for solid copper wires from the manufacturer to designate the size according to the American wire gage. In ordering stranded conductors, however, two methods have come into use.

In one, the number of strands is specified of such size as to equal a standard-gage size or a round number circ.mil. For example, "No. 8 A.W.G. stranded" or No. 0000 A.W.G., nineteen strands," or "500,000 circ.mil, sixty-one strands."

It is well to note that the first type of designation is the most common; i.e., no attempt is made to state either the size or number of strands.

In the other method a number of strands is specified each of a standard-gage size. For example, "nineteen strands of No. 25 A.W.G." or "ninety-one strands of No. 8 A.W.G."

The objections to the first method are numerous, but the main objection is that it requires the wire drawer to carry not only all the dies necessary for all the standard A.W.G. sizes, but in addition a much larger number for wire used in stranded conductors. It requires the insulated-wire manufacturer who does not draw wire to carry a very large and inactive stock of copper wire.

If the second method is standardized, it will naturally reduce the number of dies and stock of wires and will result in quicker deliveries, as the manufacturer will not have to wait for special copper to be drawn.

Francis J. White, Electrical Engineer.

An Automobile with Slat Seats!

NEW YORK, Jan. 10, 1923.

To the Editors:

How the automotive world would marvel if some maker of pneumatically-cushioned automobiles were to try to sell a vehicle with slat seats. Indeed, the possibility is simply inconceivable. Why is it, then, that electric railways operating with steel wheels on steel rails still order cars with slat seats? Sometimes the idea is varied by using a solid shaped seat with rattan covering. The belief in that case seems to be that if the eye is deceived, perhaps the buttocks may be deceived, too!

We have heard the arguments for the slat seat many, many times over. It is cheaper. It is more durable. It is less subject to abuse. I admit it is everything except more comfortable for the person who pays to sit on it. In an age when the poorest man in America knows what it is to ride on padded cushions, we cannot afford to treat the passenger this way. We must give him a cushion seat, and so far as is compatible with easy movement of passengers we should also give him a transverse seat. No person would dream of buying a slat-seated vehicle for his own riding. So why purchase one for riding by people who must be persuaded to use it?

Far out toward the setting sun is a rising railway manager who recently said to his staff in a discussion concerning future cars and motor coaches: "Boys, the vehicles we buy must be good enough for any and all of us to ride in. If they are not going to be good enough for us, they are not going to be good enough for the people from whom we get our bread and butter." These thoughts are commended to the slat-seat advocate who rides in a limousine himself but forgets there are some 10,000,000 upholstered automobiles now and many, many more to come to fit almost any street car passenger's purse. "CRITIC."

[Editorial comment on this letter appears on page 70.]

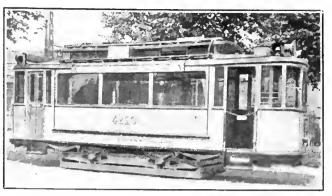
One-Man Cars in Germany

THE one-man principle of car operation is extending, though slowly, in Europe. An account of the one-man cars in Arnhem, Holland, was printed in the issue of this paper for Dec. 2. London and Amsterdam have each one or more cars on trial. At least two cities in Germany, Berlin and Dresden, have one-man cars. In each of these cases, the cars were not built for one-man operation. They are of the single-truck type and rather short, and no changes have been made in them other than to close the rear door.

A side view and nearer platform view of one of the Berlin cars are published on this page. The notice on



The Notice at the Left Declares that Passengers Will Not Be Allowed to Board This One-Man Car Unless They Have the Exact Change



In Berlin Some of These Cars Are Being Run with One Man

the step, freely translated, means "Let Passengers Leave the Car First." The small card at the immediate left of the entrance says "Have your ticket or fare ready; money will not be changed." The large sign at the left of the entrance, shown in the general side view, says that the car is a one-man car.

The same fare system is followed as formerly, the motorman punching the tickets which he gives the passengers as a receipt for payments made.

The Dresden car arrangement is much the same as that at Berlin, an old car being converted into one-man operation simply by closing the rear doors.

The fare in Berlin, at last report, had been increased to 30 marks. This, at pre-war exchange, would be \$7.20. At 0.0125 cents per mark, 30 marks would amount to less than half a cent, or to be exact 0.375 cent.

New Zealand Railway Being Electrified

SECTION of the Midland Railway, South Island, New Zealand, is being electrified on the direct current system at 1,500 volts. The section is through the Arthur's Pass, which, as explained in a recent article in the Tramway & Railway World, connects the sections separated by the Southern Alps. The section is about 8½ miles long, 5 miles being in tunnels, and the average gradient is about 3 per cent. The electrified section will form a connecting link between the eastern and western railway systems. For the present five mainline locomotives will be required, but as the traffic increases it is expected that eight will eventually be needed. The same type of locomotive will be used for passenger and freight trains. These are of 680-hp., one-hour rating, this power being furnished by four motors on two articulated trucks.

Among the salient features of the locomotives, which were built by the English Electric Company, are these: Speed at full load, one-hour rating, 18 m.p.h.; -control of the cam shaft type; brakes of four types—rheostatic, Westinghouse automatic air, Westinghouse straight air and hand. The rheostatic brake was adopted in preference to the regenerative brake because the operating conditions are such that there would not always be a load sufficient to absorb the output of a train which was regenerating.

A storage-battery locomotive is also being supplied for switching service and for use in inspection of overhead line equipment. This locomotive has 176 hp. capacity at the one-hour rating. It is furnished with a battery of 216 cells, having a total ampere-hour capacity of 83,600 at a five-hour rate of discharge. A battery similar to that on the locomotive is carried on a tender.

Association News & Discussions

Appointments by National Safety Council

THE National Salety Council, THE National Safety Council, elec-Guy R. Radley, Milwaukee Electric Railway & Light Company, chairman of its membership committee. other members are Charles B. Scott. Bureau of Safety, Chicago; A. W. Koehler, New York State Railways, Rochester; V. J. Waltz, Community Traction Company, Toledo; H. N. Withers, Galveston-Houston Electric Railway, and E. E. Thornton. San Francisco Oakland Terminal Railways. John H. Truett, United Railways & Electric Company, Baltimore, is chairman this year of the electric railway section, and Melvin W. Bridges, Chicago Elevated Railways, is secretary. The National Safety Council recently issued a special bulletin for posting in cars warning children against coasting on a street which crosses a trolley line.

A.I.E.E. Midwinter Convention

THE American Insulate of Engineers will hold its midwinter convention in New York City, Feb. 14 to 17. Among the addresses and papers of interest in the electric railway field are the following:

"Observations on Electric Railway Practice," by W. B. Potter, General Electric Company. This will be given at a joint session Wednesday evening, Feb. 14, with the Chicago section, held by means of telephone connection and loud speaking telephone. Mr. Pottar will speak in New York.

"Automatic Train Control Problems," by E. J. Blake, Gould Coupler Company, Denew, N. Y.

"Application and Economics of Automatic Railway Substations," by L. D. Bale, Cleveland (Ohio) Railway.

"Single-Phase Regeneration Series Commutator Motors," by L. J. Hibbard, Westinghouse Electric & Manufacturing Company.

On Saturday morning, Feb. 17, there will be visits to local power stations, the McGraw-Hill Company building, and other points of interest in New York

Program New York Association

HE New York Electric Railway Association, as announced in these columns before, will meet at the Hotel Commodore, New York City, at 10 a.m. on Jan. 25. The program has been tentatively arranged, and will include the following: Walter Jackson, fare and bus consultant, will present a paper on the selling principles of the weekly pass. This subject will be dis-cussed by S. W. Greenland, vice-president and general manager Indiana

Service Corporation, Fort Wayne, Ind., and W. H. Boyce, general manager Beaver Valley Traction Company, New Brighton, Pa., followed by general diseussion. L. M. Clark, vice-president Railway Improvement Company, will present a paper on the lubrication of railway motors, which will be discussed by E. A. Murphy, general manager United Traction Company of Albany, and L. J. Davis, electrical and mechanical engineer Brooklyn City Railroad Company.

There will be a buffet luncheon at noon, and in the afternoon D. C. Fenner, chairman of the Motor Vehicle Conference Committee, a joint organization of several associations in the automotive field, will present a paper on the fundamental principles of state motor vehicle common carrier regulation. There will also be a paper on insulation of catenary and other power and railway systems by Arthur O. Austin, chief engineer of the Ohio Insulator Company, Barberton, Ohio, accompanied by stereopticon slides.

The annual banquet will be at the Commodore at 6:30 p.m. and among the speakers will be the inimitable Will Rogers, who will tell the railway men how to run a railway. Other speakers will be announced later.

American Association News

Plans for the Midyear Conference

N. SHANNAHAN, chairman of the meetings and subjects committee of the American Association, has announced that the program for the midyear conference at Washington on Feb. 16 is rapidly assuming final form. The committee this year has decided to confine the two sessions to one subject each. At the morning session the general subject will be "Electric Railway Regulation." The principal address will be given by the Hon. Dwight N. Lewis of the Iowa Board of Railroad Commissioners and president of the National Association of Railway and Utilities Commissioners. At the afternoon session the general subject will be "Electric Railway Taxation," sideration being given to special imposts and taxes as well as general taxes. Senator F. N. Davenport, chairman of the New York legislative committee on taxation, will make the principal address on this subject.

At each session it is planned to have three or four railway men and commissioners lead the discussion with remarks which they may have prepared

in advance, the meetings then to be thrown open for general discussion.

The dinner will be held Friday evening at the New Willard Hotel, where the business sessions will also be held. Elaborate plans are made for entertainment at the dinner and among the principal speakers will be the Hon. Albert Bacon Fall, Secretary of the Interior, and former Vice-President Thomas Riley Marshall, now a member of the United States Coal Commission.

Technical Points in Connection with the Approaching Rail-Joint Tests

NTERESTING correspondence is be-I ing conducted in connection with the details of the tests on rail joints which are to be made soon under the auspices of the committee on welded rail joints. This is the committee which is funetioning under the American Bureau of Welding and the work of which is being financed by the American Electric Rail-

way Association.

It is the desire of the committee that general discussion of its plans be conducted at once so that the committee may have the benefit of expert opinion before final details of the testing machines and testing procedure are decided upon. Below is given an abstract of some of the recent letters which have passed back and forth, and comments upon the points raised in these letters or upon any points which ought to be considered will be welcomed by the committee. Communications should be addressed to the secretary, W. Spraragen, 29 West Thirty-ninth Street, New York City.

Some weeks ago Dr. G. K. Burgess, chief of the division of metallurgy, United States Bureau of Standards, wrote to E. M. T. Ryder, Third Avenue Railway System, New York, raising several questions. For example, he asked: "If the welds are made by the companies and shipped to the bureau*, are they to be made on straight or curved lengths?" In reply Mr. Ryder said that they should be of the correct radius and ready to install in the rotary test machine, for if the joints were shipped straight they would have to be curved on the ground by one of the Washington railway companies. This would be diffcult to do with joints having joint plates 2 ft. or more in length, and such bending of completed joints might introduce additional stresses which would affect the behavior of the joints under tests. As under actual track conditions joints are installed on curved tracks after the rail has been curved, it is desirable to follow the same

[&]quot;It is planned to conduct the tenting work in Washington on the grounds of the liu-reau of Standards,

practice with joints which are to be

The above implies that the tested rails should be curved by the rail manufacturer before they are shipped to the railway which makes up the joints. The former is better equipped to do the

bending than the railway.

In Mr. Ryder's opinion the curvature would not extend through the joints but, as in practical trackwork, the curvature would be carried up to a point just outside the joint plate, the rail being kinked at this point slightly more than is theoretically necessary in order to give a straight chord in the curve across the joint for about 21 ft. This would not affect the gage of the track materially.

Mr. Ryder expressed the personal opinion that it will be desirable to operate the rotary testing machine with the flanges of the truck wheels turned off. This is partly to avoid complicating the joint testing with flange wear on the joints, and partly to simplify the aligning of the track on the machine.

After the preliminary tests to determine the state of the art are completed, in Mr. Ryder's opinion it will probably be advisable with certain types of joints to have them made up in Washington. This will somewhat simplify the procedure, as some of the joints can be made up in place on the track of the rotary machine. With some types of joints, however, this will not be possible as they must be made where the equipment necessary for their construction is available.

Dr. Burgess also raised the question: "Can it be considered that a welded joint made in a short-radius-curvature rail will represent fairly the service that would be expected from a weld made on a tangent piece?" In Mr. Ryder's opinion it will, although in the case of individual joints there might be some variation. On the whole the differences will not be great enough to affect the

value of the tests.

MR. RYDER'S REPLY DISCUSSED

Mr. 'Ryder's reply to Dr. Burgess' questions was sent to the members of the committee. The substance of some

of the replies is as follows:

Prof. D. D. Ewing, Purdue University, agreed that the joints should be shipped to the bureau curved to the correct radius and ready for installation. He suggested that many of the objections te making the joints in the shops might be obviated by setting up a dummy track in which the conditions of abutting rail joints, under compression or tightly closed if closure only is desirable, might be easily obtained. He approved the use of flangeless wheels. He also raised a question as to the type of substructure upon which the test track is to be located, suggesting that if flexible substructure is used it may be difficult to keep the running track in correct position. On the other hand, if the track is rigidly mounted on concrete foundation the results may be different from what would be obtained in operation on standard track. However, in his opinion, on the proposed machine will also stand

up well in service.

W. W. Wysor, United Railways & Electric Company of Baltimore, Md., expressed the belief that the entire rail length, including the joint, should be made to as nearly true radius as possible, and he sees no difficulty about curving the joint as well as the balance of the rail. With skill in the use of the bending ram, curving the rail gradually, it is possible to curve it so nearly to the proper radius that for all practical purposes the radius will be true. In order to effect the curving of the rail through the joint, the rail should first be curved to the true radius and then sawed at the point where it is desired to make the ioint. The extreme ends of the rail. which cannot be curved, should be discarded. Joint plates should also be curved to proper radius by using the previously curved rail as a template. The curving of the joints could probably be facilitated by having them curved in long lengths, before cutting to the proper length for joints. All portions of the track in which the test joints are located should be equidistant from the center of the machine to avoid lurch of the trucks in passing over the joint.

According to Mr. Wysor, it is not necessary that the joints be made in the track, as track conditions can be reproduced for all practical purposes in the yard. The rail ends can be given the necessary compression by the use of drift pins driven in the holes, or by means of buttresses and wedges.

W. F. Graves, Montreal Tramways, thought that for comparative purposes it will be all right to weld the joints in a curve of the radius required by the testing machine, although in practice ioints in curves are not usually welded because the rails have to be renewed more frequently on curves than on straight track. The rail should be curved to the proper radius by the steel companies furnishing them, and extreme care should be taken in butting the ends tightly together. To minimize distortion in welding the plates should be curved to the radius of the rail.

Howard H. George, Public Service Railway, writing in regard to the Lorain bar-weld type of joint, said that with this it will be necessary to curve the rails before the joints are made. It would be entirely impracticable to bend them uniformly after the joints have been welded, besides which stresses due to the bending would be set up in the rails. The manufacturers should curve the rails because most railway properties are not equipped with powerdriven rail-bending machines, but depend on the "Jim Crow" type of bender, or some form of hydraulic bender.

H. M. Steward, Boston Elevated Railway, expressed the opinion that the rails should be curved and shipped to Washington; that at localities where the joints are to be made the rail should be cut with a saw; that the ends of the rail cut square by the manufacturer should be cut off and discarded; that the test joints should be made at Wash-

joints that will stand up well in tests ington; that the test joints should be made by men in the employ of the companies submitting the joints and not by welders secured for the purpose, and that the joints or bars used should be

curved as well as the rails.

H. H. Findley, Omaha & Council Bluffs Street Railway, pointed out that the rail should not be stressed laterally by bending after welding. Where practicable, rail should be bent, sawed and welded where the curve is perfect. The joints tested in a curve of 40-ft. radius should represent fairly the conditions met in tangent track, although the comparatively stiff construction of a curve precludes the possibility of much lateral deflection of the rail. With all types of rail, although to different degrees, lateral stresses must be provided against. Arc-welded joints must make provision for these. Laboratory tests of the "rotary type" would appear to favor the joints. Vertical load and impact tests will be of great value. However, the wheel conditions on the machine should be as nearly like those produced in actual traffic as possible. The wheel flanges might be allowed to crowd the joints part of the time, if practicable, so as to duplicate the conditions met in operation,

Heavy Traction Men Confer

N THE absence of Chairman Sidney Withington, J. C. Davidson, vicechairman of the Engineering Association committee on heavy electric traction presided at a meeting of that com mittee held in New York City on Dec. 29. Besides Mr. Davidson, the following were present: H. F. Brown, New Haven, Conn. (for Mr. Withington); A. H. Armstrong, Schenectady, N. Y.; J. M. Bosenbury, Peoria, Ill.; H. W. Cope, East Pittsburgh, Pa.; Norman Litchfield, New York City; D. J. Locke, Worcester, Mass. (for A. S. Richey). and L. S. Wells, New York City.

It was decided to endeavor to revise and amplify the bibliography of heavy traction prepared two years ago. Electric locomotives weighing less than 80 tons will be included, but the line will be drawn to exclude those not equipped to handle interchange service with the steam roads according to A. R. A. requirements. Messrs. Armstrong and Cope will undertake to collect the new data, including available information on foreign installations.

The subject of branch-line electrification was defined to include only those not a part of an electrified railroad. Information as to self-propelled cars and storage-battery switching locomo-

tives will be included.

Members of the committee were asked to review the heavy traction committee work of the four years preceding and be prepared to report at the next meeting, to be held possibly in Washington preceding or following the midyear meeting. They will also come prepared to discuss the standards, if any, which are suitable for submission to the American Engineering Standards Committee.

Maintenance of Equipment

Road Oil Tank and Kettle

BY CLIFFORD A. ELLIOTT

Engineering Department, Pacific Electric Railway, Los Angeles

road crossings on its lines and the large number of automobiles and trucks in southern California cause heavy wear on these crossings.

keep these crossings as well maintained as was desired because the specially-arranged firebox was proequipment used and method of re- vided under this boiler. In front of

ME Pacific Electric Railway of proved uneconomical. Finally it was Los Angeles has more than 1,000 decided to provide first-class equipment to handle this specialized type of track maintenance work.

A 600-gal, boiler for heating the oil before it is applied to the crushed In the past it has been difficult to rock was obtained and was mounted on a 3½-ton chassis, 14 ft. long. A

tank reads up to 100 lb. Thirty to 40 lb. of air have to be pumped up in the tank every three hours.

On the rear of the equipment is a 6-gal, eapacity tank with needle regulating valve, gage and pump complete for supplying the water that is fed into the oil burner with the fuel oil to generate the necessary steam and provide the required flame for heating the oil in the large tank. The water is conveyed from the pressure tank through 5 ft. of hollow wire, and one filling of water takes





At Left, Oil Heater and Dump Track Ready to Move to Another Job. At Right, Filling a Bucket from the Tank

handle the work with sufficient dispatch. Where the pavement at the crossing was oil macadam the material thought to be needed was mixed up at the engineering department's paving plant and moved to special-work motor car. In other cases the required amount of ?-in. crushed rock and heated roadway oil were taken to the job by truck, and laborers tamped the crushed rock in place and poured the necessary oil on it from the oil truck. When delays from traffic or other sources in-

terfered with the work, this plan-

pair followed made it impossible to this tank on the chassis is a fuel care of eight hours' work. On the oil tank of 30-gal, capacity, connected by a small fuel-oil feed pipe to an oil burner in the firebox under the large tank. The fuel oil used is coal oil and runs under a pressure of 15 lb, to the burner. A special type the job by either freight train or a of burner was constructed in the engineering department's plant shop.

HOW THE OIL IS PREPARED AND APPLIED

The air pressure is obtained for the fuel tank from a Yankee hand pump located adjacent to the fuel The pressure gage on this tank.

rear of the equipment also are the feed or check valves for regulating the flow of fuel and water. The oil is heated to 250 deg. F. before it is applied to the crushed rock.

Leading from the rear of the boiler are valves and flow pipes to admit the heated oil into hand pouring buckets or to convey it by pipe connection, when desired, into a 50-gal. hand pump kettle, mounted on wheels. When the heated oil is in the kettle it is kept at its original heat by a firebox in which coal or wood is burned.

When the kettle is not in use or it





Oil Heating Tank at Left, Kettle at flight. The Oil Is Kepl Heated in the Kettle and Sprayed Under Pressure





Far Better Penetration Is Secured than When the Oil 1s Poured from Buckets by Hand

is being moved from job to job, it is stored on the front platform of the tank truck. One of the accompanying views shows the kettle being lifted down from the platform to be put at work. This kettle, besides being equipped with a pressure pump, has 20 ft. of \(\frac{3}{4}\)-in hose with a check valve near the operating end, so that the operator can regulate the flow of oil as the oil is carried out through a three-point sprayer to the crushed rock.

Water is applied to the rail by a laborer before the oil is spread to keep the oil from adhering to the rail.

SPRAY METHOD OF SPREADING OIL IS BEST

The present method of spreading the oil is far superior to the old method of pouring it on the crushed rock from hand buckets, because the new method results in greater penetration of the oil into the crushed rock, which is thoroughly spread and tamped or rolled before the oil is applied. The new method also gives more uniform and quicker distribution of the oil. Finally, the oil always goes on at the desired temperature, an important factor in obtaining the desired degree of penetration.

The burner consumes 1 gal. of fuel oil for a continuous period of three hours to obtain the desired first heat, and ½ gal. per hour is consumed thereafter. The oil heating outfit is transported from job to job by being coupled onto one of the engineering department's 3½-ton dump trucks. There are two such trucks in the service of the engineering depart-Each carries the necessary crushed rock and tools for road crossing repair along with the oil heating and distributing equipment. equipment permits a gang to do sometimes as much as four times the work accomplished by the old method.

Equipment Used in Boston for Transporting Arc-Welding Apparatus

L long been interested in the several uses to which welding and grinding equipment may be put in connection with track maintenance. As is well known, the arc-weld rail joint has been extensively used on new track construction in Boston for several years. In consequence a considerable amount of welding and grinding equipment has been accumulated and the problem of how to obtain the utmost use from the apparatus was solved by the use of automobiles for transportation of the welding and grinding machinery. This work is under the direction of H. M. Steward, superintendent of maintenance.

Three 2-ton White trucks are used for this service. Each truck is equipped with a small jib crane suitably braced, to which is hung a 1½ton chain hoist. As will be seen from

HE Boston Elevated Railway has the accompanying illustration, the boom of the crane swings about and by means of the chain hoist the driver of the truck and one helper are able to handle the heaviest portable apparatus that is used either for welding or grinding. The truck platforms are 10 ft. long and 5 ft. 6 in. wide with the crane mounted at the rear. There is a canopy protection over the driver's seat.

> It is stated that the three trucks handle all of the welding and grinding apparatus in use during the busiest season, when eight arc-welding machines and six grinding machines are in operation, with thirty-four men employed in the welding work. In addition to transporting the welding and grinding apparatus, these trucks are used to a large extent for general miscellaneous work in the maintenance department.



Handling Welding Equipment In Hoston

New Equipment Available

Automatic Crossing Whistle

N ACCOMPANYING illustration I shows the equipment recently brought out by the National Safety Devices Company, Waterloo, Iowa, for blowing the necessary number and length of blasts on an interurban car as it approaches a highway crossing. The device consists essentially of two horizontal cylinders, a vertical cylinder, a circular steel plate with projecting teeth and an operating valve or valves, the three cylinders forming a single casting. When the operating valve is depressed, air is admitted to the lower horizontal cylinder, causing the movement of a piston rod, which by means of a connecting rod rotates the circular plate through an angle of about 90 deg. As soon as the operating valve is released, the air pressure in the lower cylinder is also released, and a powerful spring housed in the vertical cylinder causes the plate to revolve, a uniform speed of rotation being secured by suitable governor. As the plate revolves back to its normal position, the projecting teeth on its periphery engage a lever, the movement of which alternately opens and closes a valve admitting air to the upper cylinder, the valve being open when the teeth engage the lever and close when they do not. The admission of air to the upper cylinder forces out a piston rod and thus by means of suitable connections pulls the whistle cord and blows the whistle

The width of the teeth and the spaces between them therefore govern the length of the blasts of the whistle and the intervals between the blasts. The upper cylinder is connected to an air pipe leading to the bell ringer, so that the admission of air to this cylinder also rings the bell. When air is admitted to the lower cylinder and the circular plate is first revolved, a swinging arm permits the projecting teeth to pass by without moving the lever or blowing the whistle.



Whistlieg Device Applied to the Front of an Interurban Car

Rapid Soldering of Commutator Leads

THE accompanying illustration shows a form of machine for soldering commutators being placed on the market by the P. E. Chapman Electrical Works, St. Louis, Mo. The machine provides for soldering the leads in the commutator head by immersion all at one time. Provision is made by which the commutator.



Commutator Soldering Machine

shaft and ring insulation are protected. The solder is automatically cleaned of dross, as it is raised to the height of the joints by depressing the treadle. Gas burners, protective jackets, vent collar, pedestal, etc., are included in the machine. Two sizes are being marketed; one provides for commutators up to 2 in. in diameter, and the other is for commutators from 2 to 4 in, in diameter. This latter size should be of use to electric railways in connection with the soldering of air compressor leads.

The News of the Industry

Extra Compensation

Employees of San Diego Property Will Benefit in New Co-operative Plan-Welfare Work Outlined

As an incentive to employees to keep down the number of accidents, build up a friendlier relationship with the public and eliminate errors on the employees' reports the San Diego (Calif.) Electric Railway put into effect on Jan. 1 a plan whereby the men will have an opportunity to earn an additional \$5 each month.

Claus Spreckels, general manager, sent a letter to the employees outlining the requirements for the extra compensation. A clean record for each of the following items during a month entitles the employee to \$1.

(a) Having no accidents for which you are responsible.

(b) Not getting reported for discourtesy.

(c) Having no errors on mileage cards.

(d) General appearance.

(e) Miscellaneous, including passing up passengers, faxity in calling streets and oversleeping.

One of the advantages from the carman's point of view is that he doesn't have to be perfect in all five respects each time in order to participate in the award. In order to participate the men must work the full month with a layoff allowance of not more than two days. In other words, the employee must work twenty-nine days out of a thirty-one-day month.

In addition to the co-operation plan General Manager Spreckels has sent a letter to the employees reminding them of the services performed by the com-pany's welfare department, which has been in operation about six months.

The welfare department, entirely distinct from the San Diego Electric Railway Employees' Benefit Association, is in no manner supported by employees. In outlining the benefits Mr. Spreckels states that every form of medical and surgical attention which it is possible to render in the offices of the department is free of all charge except that the employee to whom this assistance is given is required to reimburse the director for the actual cost of medicine and materials used. The purpose of the letter was to acquaint the large number of employees and their families who are not aware of the welfare work with the opportunity for assistance which is being offered by the railway company.

Steam and Electric Collide

Two passengers were killed and nineteen injured at Vancouver, B. C., at 10.20 p. m. on Dec. 26, when a Great Northern freight train backed into a street car of the British Columbia Electric Railway on a level crossing at Venables Street. The street car, which was filled with passengers, came to a stop at the crossing as required.

Great Northern locomotive was pushing a train of seventeen box cars, a brakeman proceeding ahead. crossing, the brakeman gave the train the signal to proceed and this signal was read by the motorman as intended for him. When the street car was half way over the crossing, the leading box car hit it, pushing it over the track against a pole which tore through the car, wrecking it.

The electric railway was the senior road and had the right-of-way. The steam railway was required to come to a full stop before crossing and to have a man proceed ahead of its trains. Steam railway company officials say that the regulations were complied with and the street railway says that its instructions to its men carried out the orders of the railway commission. An investigation is to be held by the city authorities after the inquest.

Critic of Detroit Lines Rapped

Ross Schram, assistant general manager of the Department of Street Railways at Detroit, Mich., does not think much of "The Truth About Detroit's Car Lines," a series of articles contributed by R. R. Batson to the Evening World of New York. Mr. Schram says in the Detroit News for Jan. 4 that although the articles are supposed to be authoritative Mr. Batson spent just thirty minutes with members of the street railway department staff and twenty minutes with Mr. Couzens.

Mr. Schram also quotes from the letter of the American Electric Railway Association, to the effect that a reprint of the articles is being issued by the Committee of One Hundred. After referring to that body by saying that its chief function was to induce the United States Chamber of Commerce to bring pressure to bear on the Secretary of Commerce and thus on Mr. Wilson when President to appoint the Federal Electric Railways Commission, Mr. Schram says:

sion, Mr. Schram says:

Mr. Batson's six articles made three criticisms of the D. S. R. One was that we were not taking care of depreciation. Acting Mayor John C. Lodge answered that last week. A second was that we are not setting aside proper damage reserves. We are doing just what the Detroit United Railway did in handling its damage claims, and to date only 6 per cent of our reserve has been paid out for damages.

His third criticism was that we would not be able to reduce fares. We are spending money to improve service, which is what the citizens want. That criticism sounds odd, in the face of the recommendation made by the Federal Electric Railways Commission that fares on all privately owned lines be boosted.

If each of the 1,300 members of the asso-

owned lines be boosted.

If each of the 1,300 members of the association takes out 10,000 copies of the booklet "The Truth About Detroit Car Lines" there will be 13,000,000 of them in circulation, all knocking our lines. That this will be done is not inconceivable. There is every indication that the anti-M. O. propaganda of the public utility interests is commencing to be released.

Legislative Lineup

At the Members of Committees Announced Concerned with Consideration of Utility Measures-New Bills Appear

> Legislative consideration of matters relating to public service, which means the regulation of railroads, street railroads, gas and electric roads, telephone and telegraph lines, express companies. steam companies, certain bus transportation companies and, as a matter of fact, all matters subject to such law. devolves in the Senate of the State of New York upon the public service committee and in the Assembly upon the judiciary committee.

> For this reason, with a Democratic administration elected, and a program announced by the administration of radical proposals in the way of public service regulation, coupled with the fact that the Assembly or lower house of the Legislature remains Republican, analysis of the legislative committees as appointed by the President pro tem. of the Senate and Speaker of the Assembly are of interest.

On the Senate public service committee there are fourteen members, and there are eight new members on this committee this year. Senator Twomey, a pharmacist of Kings County, with seven years previous legislative experience, is named chairman this year to succeed Knight, Republican, who was chairman last year, while Knight is still retained on the committee.

Senator Salvatore A. Cotillo of New York, a lawyer, is a new member of the committee and a Democrat.

Senator Lacey, listed as a merchant and representing an Erie County district, is another new member of the committee. Mr. Lacey is a Democrat.

Senator Russell, a lawyer from Kings County, Democrat, is a new member.

Senator Farrell, from Brooklyn, a manufacturer and a legislator of years of experience, is another member.

Senator Sheridan, a lawyer of New York City, who succeeded Martin McCue to office and who is Democratic in politics, is also present.

Senator Carroll, a Democratic manufacturer of Kings and a veteran member of the Legislature, has also been named.

Senator Kavanaugh, banker of Waterford, Saratoga County, and Republican. succeeds himself.

Senator Hewitt, farmer from Cayuga County and chairman of the Senate committee on finance, is another new member.

Senator Lusk, Republican and lawyer from Cortland County, majority leader last year and a member of last year's

committee, is another member. Senator Downing, an accountant of New York City; Senator Dunnigan of the Bronx, an architect, and Senator Walker of New York, the present

majority leader, all Democrats, constitute the balance of this committee.

In the Assembly matters relating to public service are referred to the judiciary committee, all of the members of which are lawyers and thus it is perhaps that only on the Senate side of the New York State Legislature do matters relating to this subject obtain a human consideration.

On the Assembly judiciary committee Jenks of Broome, Republican, succeeds Rowe of Erie. It was the Jenks public service bills which started the controversy regarding present day ideas of regulation of public utilities and Mr. Jenks is a man of wonderful perception and a lawyer of no mean repute.

This committee has thirteen members and its make-up stands the same as last year, nine Republicans and four Democrats. There are six changes on this

committee this year.

The Democratic members are Cuvillier and McKee of New York, who served on the committee last year, and Cosgrove of Richmond and O'Connor of New York, new members on the committee but both recognized lawvers of standing and of previous legislative experience.

The Republican members outside of the chairman are Ullman of New York, Moran of Lewis, Barnes of Oswego and Dunmore of Oneida County, who have seen previous service with Shonk of Westchester, Benson of Onondaga and Johnson of Chautauqua.

Upon the judiciary committee of the Assembly will depend the reporting out of all matters of administrative interest relating to public service matters.

BILLS APPEAR REFLECTING GOVERNOR'S RECOMMENDATIONS

Four bills carrying out various sections of Governor Smith's recommendations for control of public utilities have been introduced. None of them is an administration measure, but they may receive the official label if they pass muster on tests as to their constitutionality. Three of the bills were introduced by Senator Lacey of Buffalo. They permit cities to regulate and reduce rates of transit companies operating wholly or partly within their limits; permit cities to license or to operate bus lines; give cities power to make rulings as to service to be furnished by transportation companies, so as to prevent overcrowding.

New Jersey Commissioners Report

The New Jersey Board of Public Utility Commissioners in its annual report to the Governor has recommended an amendment to the present public service law of New Jersey providing that when the commissioners have made a determination as to rates for a public utility, such order shall not be stayed except by order of three Supreme Court justices and that no order of the commissioners shall be reviewed by less than three justices of the Supreme Court. In case the order should be set aside by the three justices, the commissioners ask that proceedings be remitted to the board for a rehearing to fix just and reasonable rates in accordance with ruling of the court.

Recommends Establishment of Transportation District

Legislation is recommended by the Massachusetts Department of Public Utilities creating the Metropolitan Transportation District to acquire the property of the Eastern Massachusetts Street Railway Company in Boston, Chelsea, Everett, Malden and Revere and to lease this property to the Boston Elevated Railway on a rental basis similar to that by which the Commonwealth leased the Cambridge tunnel to the Elevated, so that the bulk of the cost would be transferred to the car rider.

The transportation district is to include also all the other Metropolitan cities and towns situated on the Boston Elevated system, which would thereby gain directly the advantage of a single

fare to Revere Beach.

The trustees of the Elevated are reported by the commission to be substantially in favor of the plan. The trustees of the Eastern Massachusetts protest against it on the ground that it dismembers their system, and owing to legal difficulties they maintain that if the plan is to be put into execution it should be through the process of the right of eminent domain.

A bill has been drafted by the Department of Public Utilities, however, calculated to carry the plan into effect.

Regarding the situation to the South of Boston, involving the street railway service between Boston and Hyde Park, the Department of Public Utilities finds that the city of Boston has it in its hands to solve that problem. The department was asked by the Legislature to decide what a fair valuation and a fair rental would be if the Eastern Massachusetts Street Railway lines in Hyde Park were to be leased to the Boston Elevated. The department assumes, as the elevated trustees argue, that if the property is to be taken over by the Elevated only one line, that through Hyde Park Avenue to Cleary Square in Hyde Park, should be operated by the Elevated on the straight single fare. If the other lines are to be operated by the Elevated the terms and the fares shall be left to the Elevated trustees.

The department fixes \$225,676 as the proper value of the lines which should be turned over to the elevated, but this does not include the power house which has been idle since 1920. If that power house were to be included, though it probably never more will be used in connection with the operation of the service, it should be valued at its salvage value of \$34,000 plus an amortization charge of \$31,000, making a total of \$65,000. The original investment was \$206,000.

As to rental the department recommends that it should be 5 per cent of the valuation, the lessee to maintain the property in fair operating condition and assume the burden of all taxes on the property.

Employees Indicted

Federal Investigation Results in Charges Against Former International Railway Employees

Robert C. Lacey, State Senator from the Forty-ninth district and chairman of the board of arbitration of the Central Labor Council of Buffalo, and twelve striking employees of the International Railway Company, Buffalo, N. Y., members of the Amalgamated Association, are under indictment by the United States Grand Jury charged with various Federal offenses in connection with the dynamiting of the Buffalo-Niagara Falls high-speed electric train on the International Railway's interurban line Aug. 17.

The indictment and arrest of the men comes as a result of a Federal investigation into the series of dynamiting outrages on the local and interurban lines of the International since the outbreak of the strike July 1, 1922. Co-operating with the Federal authorities were operatives from several national detective agencies employed by the railway company. The International has offered a reward of \$100,000 for information leading to the arrest and conviction of those responsible for the

dynamiting outrages.

The prisoners were indicted on the charge of conspiracy to restrain interstate and foreign commerce because the three-car electric train that was dynamited near the Buffalo city line carried more than fifty excursionists who had through tickets from Baltimore and Philadelphia to Niagara Falls. To interfere with the transportation of these passengers is violation of a Federal law. None of the passengers was killed, but all were injured and the ears were wrecked.

A large delegation of Buffalo labor men who called upon Governor Smith early in the week urged a State investigation into the strike of trainmen and other employees of the International.

Outer Belt-Project Revived

A charter has been granted at Topeka to the Missouri and Kansas Railway & Terminal Company, a \$1,000,000 corporation. Application for the charter was made by five men of Greater Kansas City. The men who applied for the charter are C. N. Prouty. enshier of the Exchange State Bank; W. E. Barnhart, an official of the Union Land Company; A. L. Berger, Kansas City, Kan., attorney, and Adolph Meyer and J. E. Rockwell, connected with the Joseph Heim interests in Kansas City. Included in the rights granted in the charter are the bridging of the Missouri and Kaw Rivers; railroad connection with every railroad in Kansas City, and the development of two new industrial centers. The charter shows 10 miles of right-of-wny by the new company, eight in Kansas City, Kan., and two in North Kansas City. The plan for earrying out the construction of the new line was dealt with at length in the ELECTRIC RAILWAY JOURNAL for Aug. 5, 1922, page 208.

New York Commissions Report to State

Interesting Comment Contained in the Reports of the Transit and Service Commissions-Plea Made for Retention of Commission Form of Regulation

BOTH the New York Transit Commission and the Public Service Commission reported on Jan. 8 to the Legislature on their activities for the year 1922. The Public Service Commission has jurisdiction throughout the State, except over traction matters in New York City. The summaries of these bodies are formidable documents. One contains about 30,000 words and the other about 25,000 words.

It will be recalled that the Transit Commission was charged by the Legislature of 1921 with carrying on work on the plan of readjustment and reorganization of the street railway systems in New York. This was in addition to its other activities. The functions of the commission as fixed by the Legislature of 1921 are threefold. It is charged with the supervision and regulation of all transit companies operating within the city of New York, functions previously subject to the Public Service Commission for the First District. It is vested, also, with the powers previously exercised by the Transit Construction Commissioner in the matter of the construction of new subways and other necessary transportation facilities; and, finally, with the preparation of the plan for readjustment covering both the affairs and the operations of the companies, as well as their relationship to the city of New York.

VALUATION COMPLETED, BUT NOT REVISED

In connection with the plan of readjustment and reorganization of the systems of New York City, the commission says that the valuation of the properties of the existing railway companies designed for inclusion has been completed, except for necessary revision, and will shortly be ready for incorporation in the forms of contract which the commission is authorized to prepare and to submit to the city authorities and the companies. An outline of the proposed plan of readjustment was incorporated in the report made by the commission to the Legislature a year ago. Further discussion of it in its present stage, and of the valuations, the commission will, however, reserve for a special report to be submitted to the Legislature, together with certain recommendations, at an early date.

The commission, during the year 1922, in pursuance of these various powers, devoted itself chiefly to the fol-

lowing undertakings:

lowing undertakings:

1. A complete investigation, public in character, of the service, management and financial status of all of the companies coming within its jurisdiction, rapid transit and surface—and including buses—conducted in its behalf by former Supreme Court Justice Shearn, as special counsei.

2. The issuance of comprehensive service orders requiring substantial increases in the number of trains and cars operated upon the subway and other lines of the Interborough and Brookiyn Rapid Transit companies.

companies.

3. The completion of the necessary con-

struction work upon subway lines included within the dual contracts of 1913, and still

within the dual contracts of 1913, and still unfinished.

4. The formulation of plans for the immediate construction of new subways calculated to expand and relieve the existing system, at a construction cost of \$218,000 000.

5. The immediate financial reorganization of the Interborough Company, with particular reference to its relationship to the Manhattan elevated properties, a reorganization under which the fixed annual charges of the company have been greatly reduced, and the means provided not only for financing improved service, but for adding materially to the company's car and power equipment.

6. The study of plans for the better handling of the suburban passenger traffic now entering the city, and carried very largely, after transfer within the city, on the rapid transit lines.

The commission explains that confronted with the fact that the rapid transit system, even with the great gains in mileage made under the dual contracts of 1913, is already inadequate, and that no provision has as yet been made for additional lines to meet the vastly greater demands of the future. it set out to secure at least the maximum present service that can be given upon the existing lines. It says that what has been gained in the way of better service by no means meets the need of the city or of the traveling public; but the companies have been brought to a point where they are at least providing approximately the full amount of rush hour service the present tracks will carry, and as complete a quota of additional non-rush hour service as the funds at their command will permit.

The commission says that without the plan of preliminary reorganization of the Interborough company, which the commission encouraged, and which was worked out largely along lines that it had prescribed, the funds necessary to finance even the partial measures of relief for which the orders call would not have been forthcoming. The operating companies, as a method of relief, preferred a higher fare. The commission, however, in a series of conferences occurring shortly after its appointment, made it clear to the companies, as well as to the committees representing various groups of security holders, that it had no increase of fare in view. The only formal request for an increase following these conferences occurred in March, 1922, when the Interborough company petitioned for the right to increase its rate. That petition was denied under circumstances set forth by the commission at length and it has not been since renewed. Instead, the officers of the company, at the instance and under the guidance of Judge Julius M. Mayer of the United States Circuit Court, and in conjunction with representatives both of the Interborough securities and of the stockholders of the Manhattan Company, turned their attention to the plan that has since been adopted. The fixed annual rental of \$4,200,000 paid for years from the joint

Interborough revenues to the holders of Manhattan stock, whether earned or not, has been cancelled, and provision made for the acceptance of a reduced annual rental, to be paid only when earned. Any future dividends earned on the Interborough stock are to be limited to 7 per cent annually; and during the next five years none is to be paid at all. So far as the Interborough Company is concerned, the \$114,000,000 of "water" in the shape of previously existing securities of the Interborough Consolidated Corporation-the former "Inter-Met" holding company - have been absolutely wiped out, and the Interborough returned to its own independent status. Through the readjustment of security issues and the deferment of certain sinking fund charges, \$15,000,000 has been realized to pay for improvements, and the general situation of the Interborough properties has so improved that the danger of receivership that has been hanging over them for months past has practically disappeared.

The work of the commission on the completion of the construction of lines of the Dual System called for by the contracts negotiated with the city in 1913, not yet finished—as well as that upon the imperatively needed new lines -would have met with greater progress had it not been for the consistently hostile attitude of the Board of Estimate and Apportionment, and its repeated refusal of co-operation.

CITY REFUSES TO CO-OPERATE

The commission was obliged to report to the Legislature, as it did a year ago, that the continued lack of co-operation on the part of the municipal authorities of the city of New York who are charged by law with certain joint duties with the commission in respect to rapid transit construction and administration, has in fact continued to be general in character. The result naturally has been serious interference with the efforts of the commission to afford the people of the city the transit relief to which clearly they are entitled.

The commission then goes with considerable detail into all its various activities, principal among them the ones just mentioned. Of its comment on the financial status of the companies under its jurisdiction and the progress under the rapid transit construction contract it is proposed to deal in a later issue. It points out the important features of the recent investigation of the operation of buses under the auspices of the city and in conlusion says:

The commission is prepared to take whatever steps may be necessary to correct these conditions and to legalize and regulate all desirable bus operation within the city, which incidentally will place some proper share of the expense of the upkeep of the streets upon the bus owners. The general subject will continue to receive its attention.

The Public Service Commission in referring to the operation of the electric railroads outside of New York city, says that for the year 1919 the loss for electric railroads as a whole was \$2,998,520, for 1920 \$2,879,590, while 1921 gives an increase in this loss of more than \$1,600,000 as compared

with the loss for the preceding year. The loss for 1921 was \$4,533,411. The number of passengers carried during the year 1921 was almost 100,000,000 fewer than the number of passengers carried during 1920. The number of passengers carried during 1920 was 743,233,247, during 1921 the number was 643,870,858. The total dividends paid during the year 1921 by all electric railroads in the State was \$419,659. This would represent a return of 6 per cent on an investment of only \$7,000,000, as compared with the book values of these plants as reported to the commission, and in many instances fixed by this and prior commissions in rate and capitalization proceedings, amounting to approximately \$250,-000,000.

COMMENT ON SERVICE-AT-COST GRANTS

The commission refers at length to the increase in the use of the one-man car and to the efforts that have been made to improve the car and its equipment. Reports filed with the commission, and its own investigations, show that the operation of one-man cars has resulted in a decrease in the number of boarding and alighting accidents. This is due to the supervision which the motorman has over this factor, as well as to the fact that in the majority of the cars in use provision is made to prevent the starting of the car until the door is closed.

On the matter of service-at-cost contracts the commission says:

One of the amendments made to the public service commission law at the lexisiative session of 1922 had to do with street railrond corporations (chapter 582, laws of 1922) by defining a service-at-cost contract and granting to this commission the power of approval of such contracts. A service-at-cost contract is defined in the law as "an agreement between a municipal corporation and a street surface railrond corporation, providing generally for operation of a street surface railroad wholly or pourtly within the limits of such municipal corporation, with a rate of fare directly or indirectly dependent upon the excess or evenues after deductions for operating expenses, maintenance, taxes, allowances for renewal and depreciation and a return on the value of the property used and useful in the service rendered."

All municipal corporations having a population of less than 1,000,000 Inhabitants according to the last Federal census and street surface railroads now existing or which may hereafter exist are authorized and empowered to enter into service-at-cost contracts. One of the amendments made to the pub-service commission law at the legisla-

and empowered to enter into service-nt-cost

and empowered to enter into service-at-cost contracts.

During the year 1922 the commission, pursuant to such statute, has considered one application for the approval of a service-at-cost contract. The application was made by the city of Rochester for the approval of a contract entered into between the city and the New York State Railways on June 16, 1920. The request of the city was joined in by the company. Certain objections were made to the granting of approval of this contract by the commission. These objections were heard and briefs were received from the various parties.

briefs were received from the various parties.

The contract submitted was one within the provisions of chapter 582, it provided generally for the operation of the street surface railroad in Rochester at a rate of fare dependent upon the excess of revenues after deduction for operating expenses, maintenance, taxes, allowances for renewal and depreciation and a return on the property used and useful in the service rendered. It gave to the city of Rochester, to a very large extent, control of the management of the railway properly through directory powers. By its terms and provisions the city acquired substantially all privileges and rights which go with numleigal ownership for the consideration of an assured return to the company upon the value of its property used in service. The contract covered very broadly the entire

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	(Cent of		Cent of		Cept of		Ceat of		Cent of
Item	Cities	Total								
5 cents	33	58	26	46	19	33	16	28	15	26
6 cents	20	3.5	23	39	5	8	9	16	5	8
7 cents	4	7	6	- 11	24	43	16	28	24	43
8 cents			2	4	9	16	16	28	13	23
	-		-				-		_	
Total	57	100	57	100	57	100	57	100	57	100

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The commission found that in all respects and in all regards, if it granted approval to the contract in question, the commission would maintain its jurisdiction and exercise its regulatory powers over all matters of extensions, service, safety of appliances and equipment, improvements, facilities, capitalization and accounting, propriety of regulations, practices, etc., as fully and completely as theretofore; that upon the complaint of the municipality or the railway company or any elitzen, or upon its own initiative, it might institute a hearing and make its determination thereon, and that any and all acts of the commissioner or the company under the contract in these regards would be subject to its review.

The rates under the contract are flexible, depending for any given period upon the relation of revenues to expenditures. The commission through the retention of its supervisory powers over the accounting methods of the company and the power thereby to control charges to fixed capital and operating expenses, thus retains the power to insist at all times on a rate which shall accord with the exact intent of the statute and the contract was given solely to the city. After a consideration of all the facts, the commission determined that the Rochester contract provided a reasonable, lawful and proper arrangement for The commission found that in all respects

the operation of the street railway system in that city, and approval of the contract was granted.

A statement was included in the commission's summary showing changes in the rates of fare since 1918.

In its report the Public Service Commission declares it of vast importance to the public welfare and comfort of the people that the public utilities over which the commission has jurisdiction should remain under the close observation of the State Government and that ample power of regulation should at all times be vested in some adequate governmental agency. The report says:

The establishment of a single regulatory commission by the Legislature of 1921 in place of two commissions, centered responsibility for regulation of utility operations. The centering of responsibility for the regulation of all utilities of a like character was an act of wisdom and has been amply justified by the results of the work of the commission during the year just closed. The actual experience of this commission warrants the making of this statement to the Legislature. rants the n Legislature.

Home Rule Agitation Renewed

Only a Few of Governors' Messages Deal with Regulatory Matters-Growing Menace of Inordinate Expenditure of Public Money Realized-Opinions on Blue Sky Differ

EGISLATIVE sessions are being held I this winter and spring in nearly all the states. Of the messages of the Governors so far received only a few deal with the public utility regulatory mat-As indicated in the ELECTRIC RAILWAY JOURNAL for Jan. 6 Governor Smith of New York has come out for home rule in New York City and for elective home rule on the part of the other cities of the State if they so decide. He states the case for municipal ownership of public utilities and says that municipalities should be permitted to purchase, build, own or operate utilities when they determine this to be in their interests. He also says that cities should be free to adopt any form of conveyance suitable to their needs, whether it be railroads or omnibuses. He reiterates the fact, of which sight is often lost, that New York City now owns railroads and operates ferry boats and says that he is simply asking for an extension of this principle to all other utilities and for all other cities.

The recommendations of Governor Len Small of Illinois are along somewhat similar lines. After reviewing what he considers the most important work of the Illinois Commerce Commission for the year he renews the recommendation made in his inaugural message and on subsequent occasions, that a well-considered plan of peoples' ownership and operation of street car lines at a 5-cent fare be enacted. He says

that the carrying out of such a program would afford an opportunity to the publie to decide by their own vote whether or not they desire to adopt a system of local transportation whereby they may be empowered to own and operate their street car lines and establish the rate of fare. Governor Jonathan M. Davis of Kansas, the successor to Governor Allen, is another chief executive who believes that much more satisfactory control of public utilities could be had by returning to local municipalities full control over their local utilities. He says that the public utility commission has failed to reduce and keep down charges to the users of public utility service. Governor Charles W. Bryan of Nebraska recommends a general statute giving all cities, towns and villages the authority to nequire, establish and operate municipal water plants, light plants, gas plants, etc., with money to be provided by taxation. He says that public utilities and common carriers should be taxed on their rate making valuation.

On one thing all the Governors are agreed. It is that the burden of taxation has become a very serious problem. In this connection the warning of Governor Percival P. Baxter of Maine is typical of most of the others. He says that it requires little imagination to plan new methods of taxation, but that the expenditure of moneys already available should receive attention. He recommends that during the early weeks of the session the members of the Legislature take daily exercises in saving "No" in order to fortify themselves against the pressure for the appropriation of money that is bound to be exerted upon them during the closing days. Governor Baxter refuses to become frightened. He sees in the discovery by the Federal Congress of socalled blocs only old friends with new names. He says that bloc is only another name for old time log rolling. Maine may always be counted on to treat its public utility companies fairly and the right to expect these companies to do the same by the people. Of the Blue Sky law he says that during 1922 new promotions with a capital totaling \$104,000,000 were refused admission to the State. According to him this law has been very ably administered.

OPINIONS DIFFER ON "BLUE SKY" LEGISLATION

In striking contrast to this is the comment of Governor Davis of Kansas to the effect that the operation of the Blue Sky department in that State has been very unsatisfactory, many times operating exactly opposite to the plain intent of the law. He recommends the enactment of a law with a heavy penalty forbidding a company from selling stock by advertising that it has been permitted to do so by the Blue Sky department. He would allow stocks to be sold only when full par value is paid in cash and requiring the examination of books before a certificate of authority is issued. It will be recalled that Kansas was the first state to enact so-called Blue Sky legislation and that similar measures in other states took the Kansas statute as a model.

One of the important matters before the people of Kansas at the election in November, it will be recalled, was the question of the activities of the Court of Industrial Relations. As Governor Davis sees it the trouble with the Court of Industrial Relations Law and its administration is that it seems not to have engaged the mutual confidence and support of both employer and employee. It does not deny the right to quit work; only the right to conspire to do so. Since the employer is one person only, and the employees are many persons, this restriction, the new Governor says, does not apply equally to both sides of the controversy. He says:

the controversy. He says:

The so-called court cannot enforce its decrees save through the civil courts, nor could it be properly clothed with power to do so. It is not a court, and the Legislature could not create a court in this manner. Followed to the ultimate conclusion, the principles involved in the attempt to regulate waste and conditions and activities through this so-called court, would involve the State in the regulation of all business and produce state socialism, a result not at all to be desired. The declared intent and purpose of this law was to prevent strikes and lockouts. Against lockouts it has proved entirely futile. It can, therefore, reasonably be said that the law has failed in its expressed purpose, and that the so-called court has failed to function and has proved to be entirely too expensive.

In consequence Governor Davis rec-

In consequence Governor Davis recommends that the law be repealed, and that there be enacted in its stead a law creating the office of industrial commissioner, consisting of one commissioner to be appointed by the Governor, with the consent of the Senate. He says there should be conferred on this commissioner power to enable him to look after the conditions and needs of industry and labor in the State, with authority to make investigations and hold hearings, and bring together employer and employee in mutual understanding and agreement.

In connection with the messages of the Governors to the Legislatures it is interesting to note that recommendations are contained in the messages of the Public Service Commissions of New York, New Jersey and Massachusetts in their reports for the year 1922. The plea of the New York commission is that the regulatory idea of the state commission be not abandoned, the recommendation of the New Jersey commission concerns the limitation of the right of appeal from rate-making decisions of the commission, and suggestions of the Massachusetts Commission concerns the board policies of future administration. All of these suggestions are referred to elsewhere in this issue.

You Don't Have to Park This Car

The Birmingham Railway, Light & Power Company has seized upon the public approval of the new parking laws put into operation by the city commission to put out the following advertisement:

"Ride the street cars. You don't have to park this car."

It is the first time the company ever advertised for passengers.

News Notes

Examination Announced.—The United States Civil Service Commission has announced open competitive examinations for mechanical and electrical engineers. Receipt of applications will close on Feb. 6, 1923.

Provides for Insurance.—The Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, will provide group insurance for the 140 employees. They will be insured for amounts from \$500 to \$2,500, according to length of service.

Trolley la! Trolley le! — According to Watts Watt Bill Strandborg, publicity agent of the Portland Railway, Light & Power Company, Portland, Ore., has some ideas on what Christmas Carols should be. A fitting one is Trolley la! Trolley le!

Wages Reduced. — The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., has reduced the wages of its railway employees 3, 4 and 5 cents an hour, effective Jan. 1. The cut will average from \$100 to \$150 annually for each employee.

Interurban Lines May Be Extended.— One result of the merger of public utility interests in the section of Wisconsin

around Manitowoc may be the early planning for extension of the Milwaukee Northern Railway north from Sheboygan to complete a loop in that section of the State.

Equality in Taxation Urged.—Among the recommendations contained in the biennial report of the Utah State Board of Equalization, submitted to Governor Mabey, is one which calls for the assessment of stage and truck lines upon the same general basis which governs the assessment of railroads. The elimination of tax inequality is urged.

Improve for Busy Season.—Preparations are being made by the Jamestown, Westfield & Northwestern Railroad, Chautauqua Traction line and the Chautauqua Lake Navigation Company for an unusually busy season along Chautauqua Lake, N. Y. Excursion arrangements are being made and track and station improvements are being effected.

Uniform Accounting System Adopted. —Trolley lines in Minnesota have accepted the uniform system of accounting as provided by the State Railroad & Warehouse Commission in accordance with the session laws of 1921. The railways had a meeting in the commission office on the subject following a call issued a week previously. There was no opposition.

Wages Adjusted.—The Potomac Public Service Company, Hagerstown, Md., has made a number of adjustments in the wage scales of the various departments of the company, with a view to equalizing conditions among its employees. The employees most generally affected are those in the transportation department. The increases there range from 3 per cent to 10 per cent. These adjustments became effective on Jan. 1.

Tunnel to Connect Queens and Jersey.—The Bergen, Harlem, Queens Association has been formed looking toward legislation which will authorize the construction of a tunnel under 125th Street New York City. The scheme is to connect Queens with North New Jersey. Several years ago this proposition was launched but was dropped because of the high cost in the wartime period. The estimated cost will be \$75,000,000.

Dinner and Dance for Employees .-More than 200 employees of the San Diego (Calif.) Electric Railway were the company's guests at a dinner and dance Dec. 29. The affair was held at The Barn, a country resort near San Diego, and the company's big Fageol and Republic motor coaches were used to transport the guests. Besides all the employees of the company who were not on active duty, the guests included the members of the Silver Crescent Club, an organization of the women employees of the Spreckels companies. General Manager Claus Spreckels, following the custom of the company, presented a gold watch and fob each to Motorman George Ecker and Motorman Charles Beck, who have completed twenty years of service with the company. In his talk Manager Spreckels voiced gratification for the spirit of loyalty in the organization.

Financial and Corporate

Sales to Customers Successful

\$1,000,000 of Prior Preferred Stock Is Oversold Among Customers of United Light & Railways

Customer ownership, tried last year by the United Light & Railways Company, has more than proved its value. Not only was a block of \$1,000,000 of prior preferred stock of the holding company sold on this plan, but this quota was oversubscribed by \$200,000, states H. E. Weeks, manager of the securities department of the corporation.

During the latter part of March, 1922, the directors of the company authorized the sale of \$1,000,000 of prior preferred stock to the customers of the company. I; was the practice in selling the stock to do so almost entirely through the employees, the only exception being that in some of the larger localities a few paid salesmen were employed.

When it was decided to sell the \$1,000,000 of stock between April 1 and Dec. 31 a definite quota was assigned to each of the sixteen companies operated by the United Light & Railways Company. During the period between April 1 and Aug. 31 the employees were not urged to sell the stock. Approximately \$200,000 was sold during that period.

With the opening of fall, however, the effort was intensified, and during the month of September approximately \$125,000 of stock was sold, while during October \$250,000 in stock was disposed of. The results during the first few days of November were especially gratifying. Announcement had been made about Oct. 15 that the price of the stock would be advanced on Nov. 15 from par to \$102 a share. This served as a stimulant to sales and there was sold in the first two weeks of November \$625,000 of stock, or at the rate of \$16,000,000 a year. The sales for the last six weeks totaled \$875,000.

The United Light & Railways Company serves 600,000 people, but all of the territory embraced was not opened for sales during the entire period of the campaign. In Chattanooga the sale of stock did not begin until about two weeks before the closing of the cam-That city was the only one which did not sell its quota. Although the Grand Rapids territory was opened about a month before the close of the campaign the quota was oversold by 140 per cent.

Cadillac, Mich., was also very late in getting started on its sale and had less than a month to sell its quota. Despite this, however, the allotment there was oversold. More than half of the stock was sold in territory known as Tri-City territory, which embraces the cities of Davenport, Rock Island and Moline. It

is very significant that in the territory where industrial conditions were probably most depressed the greatest sales were made. The Peoples Power Company, which operates in Rock Island and Moline, where the great agricultural implement factories are located, sold approximately \$300,000 of stock, although the implement factories are practically closed down. The quota assigned there was exceeded by about 80 per cent.

The splendid work done by the trainmen and other employees of the railway companies owned by the United Light & Railways Company was especially gratifying. During the campaign the percentage of ownership of stock by one railway company's trainmen was increased from 36 to 70 per cent. Another railway included in the system had almost 100 per cent of stock ownership.

During the year the company sold stock to 2,100 people and it has on its books today more than 4,600 stockholders in this issue in the communities in which it operates. These stockholders have all been acquired during the last two years. The average holding per stockholder is 4.6 shares.

The United Go-Getters club was organized in the fall of 1921. It sold more than \$500,000 of stock at that time. Although the sale in 1922 was not handled entirely by the Go-Getters club on all of the properties, as part of the properties have no organized club, it is conceded that the work of the individual Go-Getters was largely responsible for the splendid results obtained.

Judge Suggests Property Be Bought

Judge J. M. Killits of the Toledo Federal Court has suggested that patrons buy the property of the Indiana, Columbus & Eastern Traction Company as a stepping-stone in the solution of the financial difficulties of the Lima-Defiance branch. Cars are still running on schedule and it is announced by officials that service will continue until further orders from Federal Court.

The possibility of operating gasolinepropelled cars is being investigated. C. G. Taylor, president of the American Railway Operating Company, Elyria, and A. D. Bowen, president of the American Railway Motor Car Company, conferred on Jan. 5 with President D. F. Openlander and Secretary R. W. Wortman of the Defiance Commerce Club.

A public meeting will be called to discuss the proposal. The American Railway Operating Company holds an option on the Indiana, Columbus & Eastern Traction Company, Lima-Defiance spur. The car which the American Operating Company would put in service is made in Elyria,

I. R. T. Reorganized

Chairman of the Executive Committee Makes Plea for Co-operation in Transit Program

The Interborough Rapid Transit Company, New York, N. Y., has now been entirely reorganized and a full meeting of the new board of directors was held on Jan. 9. The novel characteristic of that board is that it includes three members representing the public, named by the Transit Commission. At the conclusion of the meeting Col. Grayson M. P. Murphy, chairman of the executive committee of the railway, made a public statement to the effect that the new board starts with a clean slate, and with but one cardinal plank in its platform; namely, the determination to give the city of New York the best possible rapid transit and to co-operate with all public authorities and civic agencies to that end. He said that the new board is committed to a continuance of a 5-cent fare.

Colonel Grayson explained that to make such a policy possible has involved a complete wiping out of more than \$114,000,000, par value, of securities of the Interborough-Consolidated Corporation. It has involved the reduction of the fixed 7 per cent rental imposed by the Manhattan (Elevated) Railway lease to a rental based upon earnings. It has involved the limitation of the dividends that can be paid on the stock of the Interborough Rapid Transit Company, so that there is no further risk of an excessive distribution of earnings. It has also involved provision of \$10,500,000 new capital.

The consummation of this plan, said the Colonel, has finally averted a receivership, thus saving both the security holders and the public substantial losses and inconvenience. In conclusion Colonel Murphy said:

We feel that all public authorities, persons and agencies, who have co-operated to avert the disintegration of the interborough-Manhattan System and insure the continued operation of the subway and elevated lines as a single system with a five cent fare, should be heartily congratulated.

The saving of the interborough System from dissolution makes possible immediately the active co-operation by the company with all public authorities in working out plans to insure adequate transit.

The interborough Rapid Transit Company will hend its every effort to work with every public authority in seeking to obtain the rapid and convenient transportation which the people of this city so urgently need.

need.

I have been deeply Impressed with the carnestness of Governor Smith's purpose to promote a solution of the local transit situation. I am equally certain that Mayor Hylan wishes to see this problem worked out effectively. The present management of this company has the same aim, and is unfettered by any obligations which will prevent its accomplishment.

We venture to suggest that there has been too much working at cross purposes in the past, and that the time has now come when everybody concerned may devote whole-hearted efforts toward securing an amelioration of existing conditions and a definite plan to provide for the future.

The problem is one of extreme difficulty and complexity, but public convenience is vitally at stake. We therefore invite public co-operation in our task. Its successful realization is of supreme importance to the health, comfort and happiness of the people of this city.

Reorganization details were published have been deeply impressed with the

Reorganization details were published in the JOURNAL for Oct. 14 and 21.

Abandonment Petition Filed

Petition for the abandonment of the Ithaca Short line, operated by the Central New York Southern Railroad, has been filed by the directors of the concern with the Public Service Commission at Albany.

The short line consists of 37 miles of main line between Auburn and Ithaca and 7 miles of side lines. Electric cars are operated to South Lansing from Ithaca and from there the service is by steam road. The property is valued at \$1,135,000.

Payment of Tax Deferred Six Months

Six months' deferment of the \$350,000 franchise tax which the Cincinnati (Ohio) Traction Company owes the city has been decided on by the street railway committee of the Council.

The city solicitor has been instructed to prepare an ordinance to be submitted to the Council authorizing the deferment of the franchise payment which became due Jan. 1. If the ordinance passes it will carry with it the automatic postponement of the payments of two previous franchise taxes for 1921 and 1922, the three amounting to \$1,050,000. No attempt has been made by the city to collect these three franchise taxes and officials were confident that the deferment ordinance could be put through the Council without a "hitch."

That the committee representing the traction company and the committee representing the Cincinnati Street Railway are close to consummating an agreement was disclosed by Vice-Mayor Froome Morris during the meeting. This agreement will consist in the main of the scaling down of the capitalization of both traction companies, simplification of their organizations to enable the city to deal more efficiently with them, and a divorcement of outside interests from the traction company.

Mr. Morris put off making any formal statement about the details of the mat-

ter just at this time.

The franchise tax payment was postponed six months because it is believed the two traction companies will have their merger fully worked out within that time.

Will Auction Property. - A public auction sale of the carhouse properties of the New York City Railways will be held on Jan. 18 at 14 Vesey Street. The property is located at Thirty-third Street and Fourth Avenue. The sale was previously postponed.

Authorizes Issue. — San Francisco-Oakland Terminal Railways was authorized by the Railroad Commission to issue and sell at not less than 99 per cent of face value, plus accrued interest, \$175,000 of ten-year 6 per cent serial equipment trust certificates for the purpose of paying in part the cost of fifteen new cars.

Court Directs Disposal of Funds. In the foreclosure suit of the Central Trust Company of Illinois against the Springfield Terminal Railway & Power Company, Springfield, Ohio, United States District Judge John E. Slater at Cincinnati directed distribution of \$78,230 of the funds in the hands of Receivers George Whysall and William S. Harman. This amount is said to exclude the costs of the court.

Eleven Months Statement Issued -The Louisville (Ky.) Railway has issued a statement of the first eleven months operation of 1922, compared with the The account same period in 1921. shows that for the first eleven months of the year net income has mounted, and funds are in hand to cover payment of interest bonds, dividends on preferred stock and all but \$111,963 of the \$499,-416 required for dividends on common

Deficit Continues .- Operations of the Springfield (Ohio) Street Railway continue to show a deficit, according to the report of the company for the month of December, filed Jan. 5 with the city manager. The report shows that a loss of \$2.345 was incurred during the month. not including the amount needed for accrual of funds to meet the dividends due on the preferred stock. The report showed that the company received a total gross revenue of \$49,876 during the month.

Authorizes Franchise Abandonment. -Owing to lack of traffic the commission authorized the Peninsular Railway, San José, Calif., to abandon its franchise and remove its equipment in Bird Avenue, Coe Avenue and Lincoln Avenue between the intersection of Lincoln Avenue and Willow Street and to operate its cars between San José and Los Catos by way of Campbell over Willow Street and Delmas Avenue. The order requires that the consent of the local authorities must be obtained for the relinquishment of the street railway franchise.

Will Continue as Receiver .- Harrison B. Freeman has been authorized by a court order to continue for four months more as receiver for the Hartford & Springfield Street Railway, Warehouse Point, Conn. A financial statement for October shows receipts of \$31,581 as against expenditures of \$34,640. In the corresponding month of 1921 there was a net profit of \$63. The payroll of car crews is shown to have been \$1.414 less in 1922 than in 1921 due chiefly to the use of one-man cars, but passenger receipts declined by about \$4,000.

Offer Mortgage Bonds.-J. C. Mackintosh & Company of Halifax are offering \$1,500,000 of 6½ per cent first mortgage bonds, due 1952 of the Camaguey (Cuba) Electric Company. This company is acquiring the assets of another company of a similar name that has for sixteen years operated the railway, light and power business of Camaguey, a city of 48,000 people. The bonds are the first charge on assets of the company. Net earnings for three years

have averaged \$296,796, equivalent to three times interest charges on this

Total Rides Increase. - Passenger revenues have decreased 9.3 per cent and total rides increased 16.1 per cent on the street cars of the Tacoma Railway & Power Company and the Pacific Traction Company through the operation of the dollar weekly pass system, according to the report of the companies to the Department of Public Works. The percentages are figured from the statement for November, 1922. as compared with the same month of 1921. A steady increase in passes sold is shown, with the result that 37.5 per cent of the passenger revenues and 48.5 per cent of the total rides are on the weekly pass.

City Bonds for Improvements Offered. Bankers' Trust Company, the National City Company, Harris, Forbes & Company, First National Company of Detroit, Detroit Trust Company and Keane, Higbie & Company are all offering \$20,163,000 of the city of Detroit 44 per cent and 42 per cent bonds. The yield on the 44 per cent bonds ranges from 4.20 to 4.25 per cent, while that on the 4½ per cent bonds ranges from 4.20 to 4.30 per cent. These bonds, issued for sewer, water, street railway, lighting, bridge and various public improvements, are direct obligations of the city of Detroit, payable principal and interest from taxes against all the taxable property therein.

Abandonment Application Heard .-- A hearing was recently held before the State Public Service Commission on the application of the Helena Light & Railway Company, Helena, Mont., to abandon service on its Kenwood and State Street trolley lines. The railway company was represented by its manager, A. E. Schultz, and M. S. Gunn, its attorney. Mr. Gunn contended that it was the duty of the commission to grant the petition for abandonment, if it found out that the lines were not being operated at a profit. Attorney General Rankin argued that no public utility should be permitted to construct lines which had encouraged home building and then later abandon the lines at its own free will. The commission has not yet arrived at any decision.

Stockholders Receive Message.-In a recent letter to stockholders Henry L. Doherty, president of the Cities Service Company, states that the board of directors feels satisfied that Congress will not impose any drastic legislation with respect to the taxation of surpluses. The directors declared the regular monthly dividends of one-half of 1 per cent on the preferred in cash, one-half of 1 per cent on the preferred "B" in cash and one-half of 1 per cent in cash scrip on the common and 14 per cent in stock scrip on the common stock, all payable Feb. 1 to holders of record Jan. 15. At a special meeting of stockholders of the Cities Service Company in Dover, Del., an increase in the authorized capital stock of the company from \$100,000,000 to \$400,000,000 was ratified.

Traffic and Transportation

Recommendations on One-Man Cars Accepted

Three of the six recommendations of the Public Service Commission in its report of the investigation of the oneman car accident on Second Avenue, Albany, N. Y., in which fourteen persons were injured, have been adopted by the United Traction Company and are already in force. The others will be put into force immediately.

According to H. B. Weatherwax, vice-president of the company, the recommendations of the Public Service Commission are already in force, that:

1. Before a student is qualified to operate he must successfully demonstrate his ability to stop each type of car by hand brake, service application, emergency application and regeneration methods on the heaviest grade on which he may be required to operate.

2. That the company adopt a rule applicable to all lines requiring each car to be stopped at least once on each trip by use of the hand brakes.

3. That all operators be required to stand while operating cars on heavy

grades.

The suggestions which Mr. Weatherwax says will be adopted at once are the following:

1. That students shall be required to pass a written examination before being accepted as trained operators.

2. That operators shall be examined in the rules and methods of operation at least once each six months.

3. That the foot valve method of operation be discontinued.

In commenting on this final recommendation Mr. Weatherwax said:

mendation Mr. Weatherwax said:

The valves will be neutralized as rapidly as our shop force can do the work. While we have prohibited the use of the valve in crowded sections, it was, nevertheless, a great help in facilitating service in residential districts as it permitted the operator to make change and keep his car under way in perfect control, for by simply removing his foot from the valve the car would have been brought to a dead stop almost within its own length. We are going to ask our patrons to co-operate with us by having the exact fare ready to depost in the box or by the purchase of tokens. If a good percentage of them do this it will facilitate the service and will be a convenience to them as the car will reach its destination much more rapidly and a better schedule will be had.

Rerouting Plan Satisfactory

When the city of Houston, Tex., through its Mayor, Oscar Holcombe, first proposed the rerouting of street cars so as to take the car lines off Main Street in the husiness district, the proposal was opposed by retail merchants along Main Street. It was with difficulty that the administration of Mayor Holcombe carried the plan and secured the removal of the cars from Main Street conditionally a little more than ax months ago. Under a compromise then entered into the traction company built new lines on Travis and Fannin Streets, each one block removed and running parallel with Main Street and

rerouted its cars for a period of one year, in the meantime covering the tracks on Main Street with a coating of tarvia so that they could be used again if the experiment should prove That the removal of unsatisfactory. the cars from Main Street has proved satisfactory is disclosed by a poll of Main Street retailers. A poll just taken shows fifty-two favor keeping street cars off Main Street, six want the cars returned, and four of them are noncommittal.

One-Way Traffic Test to Be Made

The Los Angeles Traffic Commission will make a trial test of one-way traffic for the purpose of determining the effectiveness of one-way vehicular traffic as well as to relieve congestion at Third and Hill Streets, in Los Angeles. was stated in the JOURNAL that the trial test had been made, but the commission announces that it has been unable to find the opportunity to put the proposed plan to a test.

Bus Line Planned by Municipal Railway

After agitation for a motor bus line along the San Francisco waterfront that culminated in a public discussion on Jan. 3, members of the Board of Supervisors of San Francisco announced that steps would be taken at once to establish such a service. The proposed route is to be about 31 miles long, following the Embarcadero past the Ferry Building to a northerly terminal at the foot of Hyde Street, which is also the terminal of the Golden Gate Ferry. The construction of an electric railway over this route is said to be impracticable because about fifty crossovers would be required where spurs of the Belt Line Railroad would have to be crossed.

The plan is to give a ten-minute service for a 5-cent fare during most of the day and twenty-minute service up to midnight. Five buses in service with one spare would probably be required. Decision has not yet been made as to the type of bus, but one-man twenty-five passenger cars are believed to be favored.

The city engineer has consistently opposed the establishment of this waterfront service on the ground that it would not pay. His department estimates the cost of maintaining this service at about \$250 a day, which would far exceed the revenue, it is believed. A net loss of \$15,000 to \$30,000 a year is predicted even after receiving the \$50 a day subsidy offered by the State Board of Harbor Commissioners. In making this offer the Harbor Commission points out that there is urgent need of service to the piers which is not now provided.

Cut in Railway Fare Not Necessary

According to a recent decision of the Public Utilities Commission of Maine, the Cumberland County Power & Light Company, Portland, Me., is charging reasonable fares in Portland. The decision dismisses a complaint which urged a reduction in fare on the ground that the financial situation of the railroad department of the Cumberland property had of late been considerably changed.

The present fare charges, which were established by order of the commission in July, 1920, are 8-cent base ticket fare for a single ride and a 23-cent base ticket zone charge, with a cash fare of 10 cents. In its findings the commission states that after a study of the financial results of the operation of the road during the period from 1912 to 1922, it was learned that during five of the e'even years included the railroad division had failed to earn a sufficient amount to pay the operating and fixed charges and the agreed dividend. During six of the eleven years included the railroad division had earned the operating expenses and fixed charges and somewhat more than a sufficient amount to pay the agreed dividend. During two of the years, 1918 and 1920, the railroad division failed to earn enough to cover operating expenses and fixed charges.

Further, the commission said that although some decrease had been made in the cost of wages during the last two years, no change in the net revenues of the railroad department sufficient to justify a reduction in fares had been disclosed by the evidence offered at the hearing in this case. Rather was the commission of the opinion that a reduction of even one-half cent in the present fares would result in a failure on the part of the company to earn sufficient to pay its operating expenses, fixed charges and dividends, if not in an

actual deficit.

Company Must Explain Non-Restoration of Service

The South Carolina Gas & Electric Company, Spartanburg, S. C., operator of the local railway, has been summoned to appear before the Sunreme Court of the State of Columbia on Jan. 30 to show cause why passenger and freight service should not be restored and full operation of the railway in Spartanburg and interurban lines be resumed. T. P. Cothran. Greenville, a justice of the Supreme Court, issued the order. Petition for mandamus was filed with Justice Cothran by the city of Spartanburg. Railway service was suspended Dec. 30 and has not since been resumed. Suspension was brought about, it is said, because the earnings of the railway lines of the company, which was lately reorganized after being in the hands of a receiver, are not sufficient to meet the expenses of its ear service. The company sought to replace railway service on some of the streets by operating buses. The city would not agree to this and the suspension of all traffic followed.

Metal Tokens to Be Used.—The Connecticut Valley Street Railway, Greenfield, Mass., has discontinued the use of ticket books and has substituted metal tokens sold at thirteen for 50 cents, two of the tokens being collected for each fare. This allows the patron a saving of 30 cents on each dollar expended.

Five-Cent Fare in Effect.—Carfare reduction to 5 cents on the lines of the Puget Sound Power & Light Company, Bellingham, Wash., offered by that company, has been approved by the Department of Public Works at Olympia, and will become effective for ninety days, or until March 18, 1923. The fare takes the form of twenty tickets for \$1.

May Effect Postal Arrangements.—Postal agents have been at Norwalk, Ohio, to see if mail can be carried to advantage between Norwalk and Willard in the gasoline cars being operated over the Norwalk-Shelby Railway. These towns are only 18 miles apart, but much of the mail dispatched at Norwalk for Willard is sent about 130 miles out of the way through the city of Toledo.

Discuss Five-cent Fare.—At a recent hearing in Charleston, S. C., the question of reducing fares on the lines of the Charleston Consolidated Railway & Lighting Company was discussed. The present fare is 7 cents. Advocates of the 5-cent fare claim that the company's operating expenses are lower now than when the higher fare was granted by the City Council.

Fare Increased Three Cents.—The Public Service Commission has authorized the Peekskill Lighting & Railroad Company, Peekskill, N. Y., to increase its fare from 7 cents to 10 cents. In the decision Commissioner Semple wrote that if an increase in fare resulted in a refusal to ride then the road would have to go out of business and the community would have no railroad at all.

Seeks Retention of Six-Cent Fare.— The Binghamton (N. Y.) Railway has made a request to the Common Council for a continuation of the 6-cent fare. The 6-cent fare agreement expires on Jan. 15 and if not renewed the 5-cent fare will again go into effect. The fare extension was discussed at a recent conference at which were present the Mayor, corporation counsel and the receiver of the company.

Allows Ten-Cent Rate.—The Black River (N. Y.) Traction Company is permitted to charge a 10-cent rate for carrying passengers from any point in Watertown to Brownville, according to a recent dismissal by the Public Service Commission of a complaint against that rate. The 10-cent rate was being charged under a tariff filed in February. The complaint sought a reduced round trip fare of 15 cents.

Buses Received. — The Springfield (Mass.) Street Railway has received the first of two motor buses to be used as a temporary means of transporting passengers across the new Hampden County Memorial Bridge connecting Springfield

with West Springfield. It is a Selden bus with a Kuhlmann body and seats thirty persons. It is of the pay-as-youenter type. The buses will be painted yellow, to match the railway company's cars.

Book Reviews

Commercial "Baedeker" of Latin America

Commercial Travelers' Guide to Latin America. Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. Published by Superintendent of Documents, Government Printing Office, Washington, D. C.

The new edition is almost a new work, representing a complete rearrangement of data, the addition of a large quantity of new details and a considerable improvement in the quality of most of the sections. A new bibliography is included. The edition also contains a number of new paragraphs submitted by scores of commercial travelers who had been asked to check up the old edition.

The new edition contains forty maps, especially drawn for it. It is published in regular standard guide-book form, including thin paper, flexible covers and a special differentiation of typog-The book may be fitly deraphy. scribed as the commercial "Baedeker" of Latin America. It contains 734 pages, with such details as steamship lines and railroads, time tables and connections, road routes, hotels and rates, taxes on travelers and restrictions, duties on samples and advertising matter, etc. The book can be obtained from the Superintendent of Documents at a nominal price.

Coal-Tar and Water-Gas-Tar Creosotes, Their Properties and Methods of Testing

By Ernest Bateman, chemist in forest products. Professional Paper — Bulletin 1,036 United States Department of Agriculture. Government Printing Office, Washington, D. C.

At the Dec. 19 meeting of the Engineering Association committee on wood preservation this new publication covering the methods followed, and results obtained in important research work on creosotes was highly commended.

Power Commission Issues Report

Second Annual Report of Federal Power Commission, Washington, D. C.

In its second annual report, the Federal Power Commission states that as the report went to press the grand total of applications for permits and licenses received had been 357, involving in excess of 21,100,000 hp. Nearly one-half of the aggregate horsepower is represented by applications upon the St. Lawrence, Columbia and Colorado Rivers, upon which in general action has been suspended, due to the unsettled status of water-power privileges on these rivers.

The report states that the chief purpose in the creation of the commission was to secure a common policy and a single executive agency in water-power administration. This purpose, however, has not been accomplished. Other agencies have been required to continue their independent activities, and these activities are not controlled by a common plan and are not subject to a common direction. Amendment of the act creating the commission is needed.

Among the permits authorized is one for the Washington Water Power Company on the Columbia River, involving 153,400 hp. capacity; another is for the Portland Railway, Light & Power Company, on the Clackamas River, involving 88,600 hp. The latter company was granted a license on the same river, involving 30,000 hp.

Of the applications referred to above as having been received by the commission, a number covered installations already made and in operation.

Twelfth Annual Report of Director of Bureau of Mines

Government Printing Office, Washington, 1922

This report covers the fiscal year ending June 30, 1922. It is of interest to electric railway men principally on account of the sections dealing with coal.

Elementary Book on D. C. Machinery

Direct-Current Machinery. A text-book on the theory and performance of generators and motors. By Harold Pender, Ph. D., University of Pennsylvania. John Wiley & Sons, Inc., New York, N. Y. 314 pages. Illustrated.

In this introductory text on the subject covered by this title, the author has endeavored to explain the theory and general principles of operation of generators and motors without having design considerations primarily in mind. In his introduction he states that he does not consider design of machinery suitable for undergraduates, hence he has gone into the matter of design only to the extent necessary for the student to acquire a thorough knowledge of basic principles upon which design depends. While the topics are the same ones which are covered in many other texts, the treatment is original and interesting. It is almost non-mathematical in character, the formulas used being of simple nature. The book is mentioned in this column for the reason that it is of the kind that can be read with profit by electric railway electrical engineers who desire to keep up their "theory" and for other engineers outside of the electrical group who feel the need of knowing something of the "why" of the machines which they may have to handle.

Society for the Promotion of Engineering Education. Booklet containing information regarding the purpose and activities of the society, of which Dean F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa., is secretary.

Personal Items

Mr. Wheeler Goes Abroad

General Manager of Olean, Bradford & Salamanca Railway to Resume Construction Engineering Work

R. H. Wheeler has resigned as general manager of the Olean, Bradford & Salamanca Railway, Olean, N. Y., effective April 1, to take up work abroad managing a large engineering and construction project. Mr. Wheeler has been connected with the property at Olean since 1921 as operating manager of 100 miles of electric interurban railway operated at 600 volts d.c. The railway is essentially an electrically operated short line having rates and freight traffic connections with the trunk lines.

He came with the road as manager for the receiver of the Western New York & Pennsylvania Traction Company on Sept. 1, 1921, and general manager of the Olean, Bradford & Salamanca Railway on Oct. 1, 1921. Not only has he been successful in rehabilitating the physical property of the railway and in developing its earning power, particularly the freight earning power, but he has been emlnently successful in bettering the relations of the road with its employees. The personnel has been greatly improved under his direction, and the esprit de corps built up to the point where competition has become keen among the rank and file in carrying out the details of the work of operating the road.

In working out successfully the problems that confronted him Mr. Wheeler brought to bear upon them a wealth of engineering knowledge and a broad human sympathy, the result of previous training in handling matters requiring the exercise of engineering skill and so-called human engineering. He was born on Jan. 29, 1888, and began his professional career as a bachelor of electrical and mechanical engineering as a test engineer with the General Electric Company. From 1911 to 1913 he was principal assistant engineer of the railway locomotive department of the General Electric Company in the design of railway locomotive and general steam railway electrification work. From 1913 to 1916 he was assistant electrical engineer of the Mount Royal Tunnel & Terminal Company, Montreal, P. Q., in charge of designing, testing and installing electricity on the Mount Royal terminal of the Canadlan Northern at Montreal with full charge of 2,400volt d.c., locomotive and multiple unit car design and operation. From 1916 to 1918 he was designing engineer for the Shawinigan Water & Power Company at Montreal, his work there including the installation of 3,300-volt alternating current on the Shawinigan Falla Terminal Rallway,

a switching property. During 1918 he was assistant manager of power apparatus department, U. S. Explosive Plant C, at New York City and Nitro, W. Va., for the war department. Next he was made traffic manager of the plant at Nitro for the Hercules Powder Company. Subsequently he became consulting expert for the powder company. From 1919 to 1921 Mr. Wheeler was assistant electrical engineer for Dwight P. Robinson & Company, New York, traveling abroad extensively where he examined and studied among other things all systems of electrification in Europe except in Russia.

Edward D. Merrill Resigns

Edward D. Merrill has resigned as assistant superintendent of transportation of the Philadelphia (Pa.) Rapid Transit Company. Mr. Merrill was graduated from the Massachusetts Institute of Technology in 1909. He was engaged with the Union Pacific Railroad as a civil engineer for several years and then entered the employ of the Puget Sound Traction, Light & Power Company, with which he remained from 1914 to 1918. He next became connected with the Milwaukee Electric Railway & Light Company with the title of assistant superintendent of transportation. He resigned from the company at Milwaukee to go to Philadelphia.

Mr. Turner Makes Detroit Survey

The Detroit Rapid Transit Commission has voted to employ Daniel L. Turner to make an immediate survey of rapid transit possibilities in that city. He will investigate the practicability of both subway and elevated systems for Detroit. It is estimated that the work will take about a year. The survey will also include a consideration of the suburban transit situation as regards the city of Detroit. Mr. Turner is chief consulting engineer of the New York Transit Commission. Members of the Detroit Rapid Transit Commission, which was created by former Mayor James Couzens shortly before he resigned, are Andrew H. Green, Jr., Clarence W. Hubbell, Willard Pope, Col. H. W. Alden and Col. Sidney D. Waldon. The Council has voted the commission \$50,000 for preliminary expenses, and asked for a complete report within a year, together with definite recommendations to the voters by April, 1924.

Thomas D. Connell has resigned as secretary of the Fairment Chamber of Commerce to accept a position with the Monongahela Power & Railway Company in charge of industrial matters in connection with the traffic department. Mr. Connell will be associated with C. H. Hardesty, head of the traffic department.

New Auditor of United Traction Company

The professional record of W. A. Blasing, appointed on Dec. 18 auditor of the United Traction Company with offices at Albany, is crowded with eventful activities ever since his entry into professional life in 1899. Mr. Blasing was born at St. Paul, Minn., in 1882. He was educated in the grammar and Mechanic Arts High School, being graduated from the latter in 1899. The same year Mr. Blasing entered the accounting department of the St. Paul. Minnesota & Omaha Railroad. After working in various branches of that department, in 1903 he entered the service of the Texas & Pacific Railway with headquarters at Dallas, Tex., in the capacity of statistician, from which position he was advanced to chief clerk to the auditor.

In 1909 Mr. Blasing became auditor of the Gulf, Texas & Western Railway with headquarters at Dallas, and remained in the service of that company until 1917, during which year he became general auditor of expenditures of the Illinois Central Railway with headquarters at Chicago. While in Chicago he served as chairman of the committee having in charge the investigations in connection with plant facilities and operations; chairman of the committee having charge of auditing of various parent bureaus in the central west and southern regions, and during his service with the Illinois Central compiled a formula to facilitate the determination of terminal costs which has become a standard.

On March 1, 1920, Mr. Blasing severed his connections with the Illinois Central and came with the Delaware & Hudson Railway as general assistant to the auditor, in charge of the claims against the United States Railway Administration covering transactions growing out of the period of federal control and remained in that capacity until Dec. 18, 1922, when he was named assistant secretary and auditor of the United Traction Company, the Hudson Valley and the Troy & New England Railroad.

Harry L. Harding has accepted a position in the securities department of Stone & Webster, Inc. Mr. Harding served seventeen years as assistant treasurer of the Houston (Tex.) Electric Company. A successor to him in that capacity with the Houston Electric Company has not yet been named.

L. L. Odell, former vice-president and general manager of the Empire State Railroad, Syracuse, N. Y., which was recently taken over by the Rochester & Eastern, has been named manager of the Central New York Southern Railroad with headquarters at Ithaca.

R. S. Hecht, president of the New Orleans Public Service, Inc., and president of the Hibernia Bank & Trust Company of New Orleans, has returned from a two months visit to South America. He has a favorable view of financial conditions south of the equator

107

and recommends representatives of big American concerns to go to the leading South American republics to learn about these countries and their people.

William J. Hagenah, of the firm of Hagenah & Erickson, public utility engineers, Chicago, who, with a staff of engineers and accountants, has been engaged on public utility investigation work in South America, has returned to the United States. The work in question, which covered gas, tramway, telephone and electric light and power properties, extended over a period of one year and was undertaken for foreign banking interests.

W. W. Hawthorne was recently promoted to the post of assistant superintendent of transportation (south side) of the Chicago Elevated Railways. It was in 1898 that Mr. Hawthorne came to the Elevated following several years service on various steam lines as telegrapher. In February, 1903, after serving as guard, train clerk and trainman he became a dispatcher and four years later assistant trainmaster. In 1913 he took on the duties of trainmaster, which position he held until his recent appointment as assistant superintendent.

Obituary

Robert Enos Adreon

Robert Enos Adreon, president of the American Brake Company and acting Southwest district manager of the Westinghouse Traction Brake Company, died suddenly of apoplexy on Jan. 6. Mr. Adreon was born in St. Louis on Nov. 1, 1876, a son of the late E. L. Adreon, who also was president of the American Brake Company at the time of his death some years ago. He was graduated from Purdue University in 1902 with the degree of mechanical engineer. His first position was that of chief draughtsman with the Imperial Electric Light & Power Company, St. Louis. In 1903 be joined the Westinghouse Automatic Air & Steam Coupler Company, of which he subsequently became vice-president and general manager. In 1908 he resigned to enter the employ of Westinghouse, Church, Kerr & Company, contracting engineers. He was appointed assistant general manager of the American Brake Company in 1911, later becoming general manager, then vice-president and general manager, and on April 10, 1919, he was elected president and general manager.

Mr. Adreon was a director of the National Brake & Electric Company, Milwaukee; the Safety Car Devices, St. Louis; the Mercantile Trust Company, St. Louis, and the St. Louis Chamber of Commerce. He was a member of the board of managers of the Industrial Commission, St. Louis Y.M.C.A., the Air Brake Association, the Traveling Engineers' Association, St. Louis Engineers' and the St. Louis Railway and other clubs. Mr. Adreon is survived by his wife and three-year-old

daughter.

Manufactures & the Marktes

New of and for Manufacturers—Market and Trade Conditions A Market Open to Railways and Manufacturers for Discussion of Manufacturing and Sales Matters

Natal Contract to British

Material Under \$20,000,000 African Contract Will Be Supplied by English and Affiliated Firms

British firms have secured important contracts in connection with the electrification on the main line of the Natal (South Africa) Railways from Glencoe to Pietermaritzburg. The distance is 170 miles. The total value of the contract is about £4,000,000. The firms include the Metropolitan-Vickers Electrical Company, C. A. Parsons & Company, Babcock & Wilcox, the British Thomson-Houston Company, the Telegraph Manufacturing Company, A. Reyrollo & Company, the South African General Electric Company, and Siemens Brothers & Company.

The Metropolitan-Vickers Company will build seventy-eight electric locomotives of the 0-4-4-0 type. Three locomotives coupled together (with multipleunit control) will be capable of hauling a train weighing 1,800 short tons up a 1 per cent grade at 21 to 22 m.p.h., and on level tangent track at 36 m.p.h. The same three units are to be able to start the same weight of trains up the same gradient and attain a speed of 22 m.p.h. in three minutes. They are also to be capable of holding a train of 1.640 short tons on a falling gradient of one in fifty by regenerative action The normal train will weigh about 1,430 short tons. The machines are to be of the double bogie articulated type. Each of the four motors employed is to be of 300 hp. Each locomotive will weigh about 65 long tons.

The English Electric Company is delivering to the Midland Railway of New Zealand five main line electric locomotives and one battery locomotive for shunting. The machines will be used on the Arthur's Pass section through the Southern Alps, which will connect the eastern and western railway systems on the South Island. This section

Metal, Coal and Material Prices

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Metals-New York	Jsn. 9, 1923
Copper, electrolytic, cents per lb Copper wire base, cents per lb Lead, cents per lb	16.75
Zine, cents per lb	7.20.
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Ham ton Roads, gross tone	\$8.375 5.375 ns 3.625 ns 2.87 ns 2.25
Materials	
Rubber-covered wire, N. Y., No. 14, p. 1,000 ft. Weatherproof wire base, N.Y., cents per l Cement, Coloago net prices, without bag finseed oil (5-bbl.lots), N.Y., cents per gr White lead, (100-lb.keg), N.Y., cents per Turpentine, (bbl. lots), N.Y., per gal	b. 16.50 b. 16.50 cs. \$2.05 il. 93.00 b. 12.375

is 8 miles long, 5 miles of which is in tunnel, and the gradient is one in thirtythree. The English Electric Company has a contract for the whole electrical equipment. Each locomotive will have four motors of 170 hp. each. One locomotive will be used in the case of passenger trains and two for freight trains. The speed is 18 m.p.h. In view of the heavy gradients there are four brakes, rheostatic, Westinghouse automatic, Westinghouse straight, and hand. The rheostatic has been adopted in preference to the regenerative brake, because the power house supplies the railway load only.

A Double-Truck Motor Bus

A double-truck motor bus which is so designed as to comprise a good many of the best features of electric railway cars has been placed on the market by the American Motorway Equipment Company, New York. It is equipped with what the manufacturer terms standard street car type rigid trucks, front and rear, both of which are detachable for servicing. The manufacturer claims that the flexibility of axles is equal to any street or road conditions. The car has eight speeds forward, two in reverse, short turning radius and all eight wheels equipped with air brakes. The doors are operated by air and arranged for one-man operation with rear entrance having turnstile, and pay-as-you-exit at front. It is presented as a typical street car designed and built for organized street car interests.

Personnel Changes Announced

The Westinghouse Air Brake Company, Wilmerding, Pa., has announced these appointments in the eastern district:

E. W. Davis, heretofore stationed at New York as representative Westinghouse Traction Brake Company, is promoted to representative, Westinghouse Air Brake Company, and Westinghouse Traction Brake Company, in charge of the Boston office.

G. H. Martin, heretofore mechanical expert for the Westinghouse Traction Brake Company, is promoted to representative Westinghouse Air Brake Company and Westinghouse Traction Brake Company, with headquarters at Boston. F. H. Whitney, heretofore represen-

F. H. Whitney, heretofore representative of the Westinghouse Air Brake Company, has been promoted to export representative Westinghouse Air Brake Company and Westinghouse Traction Brake Company, at New York.

H. B. Gardner is appointed representative Westinghouse Air Brake Company, reporting to the New York office. Mr. Gardner was formerly connected with the Locomotive Stoker Company.

Rolling Stock

Cincinnati & Dayton Traction Company, Hamilton, Ohio, has ordered four new one-man cars for use in the city of Hamilton. It is expected they will be in operation within three months.

Indianapolis, Ind.—Damage estimated at from \$10,000 to \$12,000 was caused by a recent fire in the carhouse of the Beech Grove Traction Company in a suburb of Indianapolis. One car was put out of service and probably damaged beyond repair. The others were operated without glass for a couple of days until temporary repairs could be made. The flames started in one of the one-man cars bought some months ago. Two other one-man cars were badly damaged, as were two of the older type of cars.

Track and Roadway

Salina (Kan.) Street Railway is relaying about 8,000 ft. new 80 lb. rails, with white oak ties.

Long Beach, L. I.—Tracks are being laid for a municipally owned trolley system to surround the entire island beginning at the railroad station and running parallel with the boardwalk.

Trenton & Mercer County Traction Corporation, Trenton, N. J., has been instructed by the Trenton City Commission to remove its switch on North Broad Street to a point further away from the center of the city.

Jamestown, Westfield & Northwestern Railroad, Jamestown, N. Y., is laying new 90-lb. rail from Jamestown to Mayville. This installation will greatly facilitate the hauling of freight.

Portland (Ore.) Railway, Light & Power Company will spend \$5,000,000 in 1923 in improvements and extensions to its properties. About half of the sum will be applied toward construction of the great hydro-electric power generating plant on the Oak Grove tributary of the Clackamas River. Franklin T. Griffith, president of the company, who recently returned from the East, has made this announcement.

Power Houses, Shops and Buildings

Cleveland, Sonthwestern & Columbus Railway, Cleveland, Ohio has applied to the Bucyrus City Council for permission to build a freight station there.

Lake Shore Electric Railway, Cleveland, Ohio, will soon build a new depot for passengers and package business on its site at Main Street and McPherson Highway, Clyde, Ohio.

Salt Lake & Utah Railroad, Salt Lake City, Utah, will enlarge extensively its facilities at the site of the new steel mills between Provo and Springville, Utah. New tracks and sidings will be installed at the steel site to take care of increased traffic, freight and passenger, which necessarily will come with the beginning of construction work on the blast furnace and coke ovens of the Columbia Steel Corporation, which is expected to begin about March 1.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has been granted a certificate of convenience and necessity by the Indiana Public Service Commission for the development of the West Tenth Street power plant in Indianapolis, and for the construction of transmission and distribution lines in and outside of Indianapolis.

Trade Notes

A. E. Jones, sales engineer in the New York office of the Terry Steam Turbine Company, has accepted a position in a similar capacity with W. B. Connor, Inc., 90 West Street, New York City.

Standard Underground Cable Company, Westinghouse Building, Pittsburgh, Pa., announces that it moved the Boston sales office of the company on Jan. 1 from its former location in the Delta Building to 609 Unity Building, 185 Devonshire Street, Boston.

The Nichols-Lintern Company, Cleveland. Ohio, has equipped twelve new cars of the Indiana Service Corporation, Fort Wayne, Ind., with the latest Nichols-Lintern Company's safety signaling devices. Additional cars, equipped in the same way, are to be delivered in the near future.

Uchling Instrument Company, Paterson, N. J., has appointed the Mine & Smelter Supply Company of El Paso, Tex. as its exclusive representatives for CO₂ recording equipment and other power plant recording instruments in the States of Arizona and New Mexico and West Texas, as well as in the Republic of Mexico, north of Mexico City.

Ohmer Fare Register Company, Dayton, Ohio, has acquired the fare register and fare box business of the Dayton Fare Recorder Company and the Recording & Computing Machines Company of the same city. Included with this transfer is the business of the Sterling-Meaker Register Company and the New Haven Register Company, which was previously acquired by the Dayton Fare Recorder Company.

Comhustion Engineering Corporation, New York, N. Y., has announced the acquisition of the Quinn Oil Burner & Torch Company. W. R. Quinn, former president of the Quinn Oil Burner & Torch Company, has become associated with Combustion Engineering Corporation as manager of its fuel oil department. The company says it is now prepared to furnish engineering service for the solution of any problems incident to the installation of this equipment.

Virginia Railway & Power Company, Richmond, Va., will install 300 Johnson fare boxes in Richmond, Portsmouth,

Petersburg and Norfolk, Va., officials of the company have announced. The installation of these boxes will do away with the use of tickets on the system and means the installation of tokens, 500,000 of which have been ordered. The Johnson fare box has been in use in Norfolk, where seventy-five received a tryout, and proving satisfactory are to replace gradually the old fare box throughout the entire system.

Metal & Thermit Corporation, New York, N. Y., has equipped its Jersey City welding shop for making welds on lighter sections by means of the oxyacetylene and electric processes. This is in addition to its present excellent facilities for undertaking thermit welding repairs. This service will be of particular value in cases where large production work is desired. The company is now in a position, therefore, to undertake prompt welding repairs or quantity manufacturing of all kinds for customers in the surrounding territory. Work can be called for and delivered by truck. This policy of equipping welding shops with the additional welding facilities, as described above will later be extended to the other welding plants of this company.

National Railway Appliance Company, New York, N. Y., announces its appointment as agent for the Turnstile Car Corporation and the E-Z Car Control Corporation. These companies manufacture the turnstile and the necessary control equipment to convert or build cars, particularly of the large double-truck type, into one-man equipment. Such equipment is now operating exclusively and successfully in Syracuse, Rochester, Schenectady, Toledo, etc. These cars have complete safety features and utilize ordinary standard type control and air brake apparatus previously in use. Any information or replies to inquiries will be gladly furnished from the above office of the National Railway Appliance Company, Grand Central Terminal, 452 Lexington Avenue, New York.

New Advertising Literature

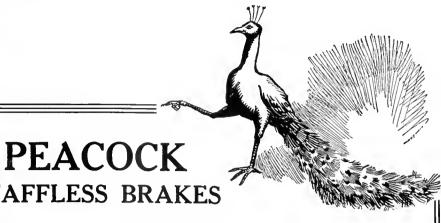
Louis Allis Company, Milwaukee, Wis., has recently published a bulletin describing and giving full information with regard to the L-A, Type H. D. heavy duty motor.

Bridgeport (Conn.) Brass Company has issued a forty-seven-page illustrated booklet called "Brass Pipe and Piping." The pamphlet describes in detail when and how brass pipe should be used.

St. Louis (Mo.) Car Company has issued Catalogue No. 103. This is a sixteen-page illustrated booklet entitled "Safety Cars," which describes this type of car built by the St. Louis Car Company.

General Electric Company, Schenectady, N. Y., has issued an interesting anniversary number of Schenectady Works News under date of Dec. 8. It tells the history of the growth of the Schenectady works since its founding, thirty-six years ago.





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\$1,250,000 improvements will be made by the Tri-City Railway & Light Company at Davenport, lowa.

\$5,500,000 incorporation announced of Southwestern Gas and Electric Company operating railway lines in Texarkana.

Immediate rehabilitation coming on Naumee Valley Railway. Seven cars to be purchased immediately.

\$1,355,303 Surplus in eleven months shown by Virginia Railway & Power Company.

Dividends declared by Springfield (Mass.) Railway Companies, Springfield Street Ry. Co. and Worcester Consolidated Street Railway.

\$64,857 earned in excess of operating cost by Boston Elevated Railway in five months.

\$132,565 net after taxes earned by Beaver Valley Traction Company for ten months ended Oct. 31.

For the first time since 1917, New York State Railways will pay dividends. This means distribution of \$733,817.

November receipts of Cincinnati Traction Company show increase of \$24,646 over same month last year.

\$1,850,259 is net income of Philadelphia Rapid Transit Co, for eleven months.

Morris County Traction Company will install automatic block signal system.

\$500,000 improvements planned by Gary (Ind.) Street Railway.

100 new cars just ordered by Chicago Surface Lines.

Day by day in every way
the field gets better and better

Electric Railway Journal, New York

Flexibility
Non Hygroscopic
Heat Resisting
Chemically Neutral
Maximum Elasticity

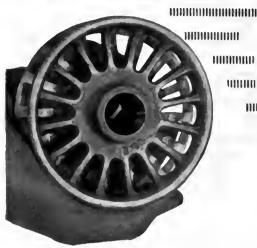


IRVINGTON seamless bias tape varnished cambric is made in widths of ½ in. and wider. Length 36 and 72 yd. rolls. Thickness .005 to .015 in. The advantages of a SEAMLESS over a sewed bias tape are: It can be continuously wound without the necessity of stopping to cut out a seam. Assence of seam avoids air pockets and the consequent lowering of dielectric at that spot. Can be wound with a taping machine. Will successfully supplant method of insulating with linen tape and the subsequent impregnation with insulating varnish. Seamless bias can be wound with lap instead of butt joint.

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Established 1905

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Ripping off the sleet is easy!

It's merely a matter of having the right kind of equipment on hand at the right time, and having it in sufficient quantity to meet the worst conditions of winter weather that can possibly occur.

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SLEET CUTTERS Should be ordered now

Do not delay until the unexpected early storm cleans out your stock of sleet cutters. It's too late then, to wire somewhere for additional ones. Even a slight interruption of traffic will cause more loss of revenue than the cost of sleet cutters for a dozen winters.

Columbia Sleet Cutters are widely used, because they are most effective cutters and yet last longer in spite of burning arcs and hardest wear.

Write your order today



The Columbia Machine Works

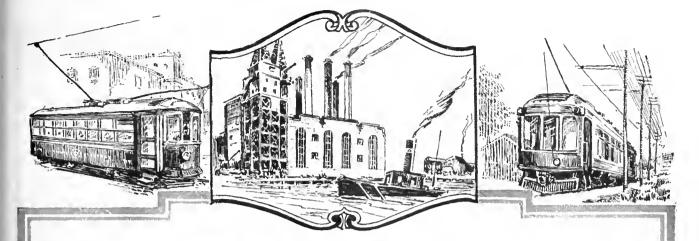
and Malleable Iron Company Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

E. Keller, Brooklyn, N. Y. F. C. Hedley, Brooklyn, N. Y. E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga. F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

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Most of you know something about our reliable Rolling Stock Lubricants.

Many of you are using our Lubricants in power plants and substations.

More of you are getting to know how TEXACO Crater Compound has revolutionized and improved gear and pinion lubrication,

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Motor Oils, the clear, clean, full-bodied, golden colored lubricants for buses and trucks—and TEXACO Gasoline, the volatile gas for automotive use and for blow torches.

And thousands upon thousands of lamps and lanterns are burning brightly and clearly with TEXACO Burning Oils.

More and more roads are using all of them—the more, the better for the roads

We said that we wanted to do one thing, but we'll steal a little space to tell you another.

The finishing touch, the thing that has made TEXACO the choice for lubricating millions of car miles, and all that that implies is TEXACO Service.

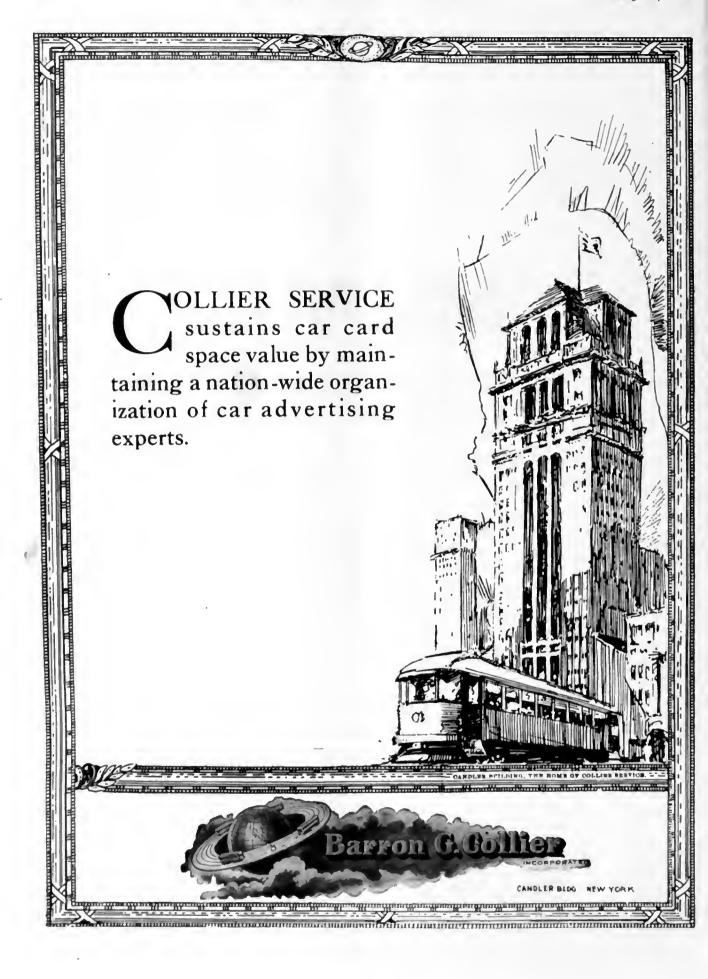
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gate, advise, demonstrate and co-operate, as desired. They are the men who will help you run your ears and power plants at lowest final cost for operation and maintenance. If you know them you will endorse that! If you haven't yet met them, you will be pleased to meet them. Say when!







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> American Machinist

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Published in Chicago

Engineering and Mining Journal-Press

American Machinist European Edition

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HE measurement of value of human achievement must include the capacity for concentration. No great undertaking has ever been completed without a control of this force.

I From the workman who knows the details of his routine, to the master who conceives and directs a vast enterprise, to the engineer who creates a new device, originates a better method, plans a scheme of operation, evolves a system of industrial evaluation, or solves a problem in economics, each in turn must command concentration in proportion to the true value of his accomplishment.

In The most difficult thing man has to learn is the science of concentration. It is also the most important quality for progress. The spark of genius is at some time struck within the consciousness of all men. Only those who possess or have developed the power of concentration are able to retain this spark and make it become a refining and creative flame. Here is the one common characteristic of all great artists, statesmen, masters of industry and engineers.

In the case of the engineer, the study and practice of concentration is an essential feature of his advancement in his profession, a distinct feature of his training. He must be able to muster all his mental forces in perfect order and obedience.

It is this capacity for concentration that has made it possible for the engineer to lay down the course man must follow if he would progress. And it is this course of which our present state of impatient indecision is in so great need.

Until we accept the practical conclusions of the engineer our future will be handicapped by chance. Until we keep faith with his expressed principles of economics, the principles of fair return for fair effort, and of effort based on the science of service, our means and aims of life will be cheap and unprofitable.

If we would go forward we must follow the established course laid out by the engineer.

Power

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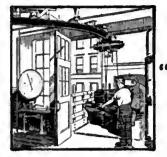
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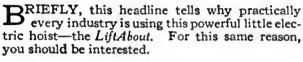
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Loads lifted and moved at remarkably low cost"



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Many possible uses for this powerful little hoist are suggested by the installations pictured in the LiftAbout folder. Mail the Coupon today for a Copy.

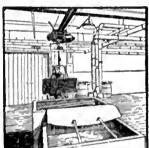


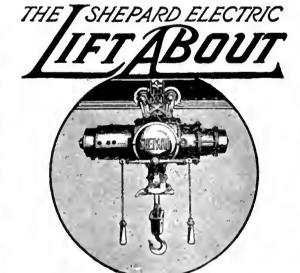
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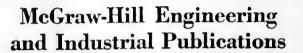
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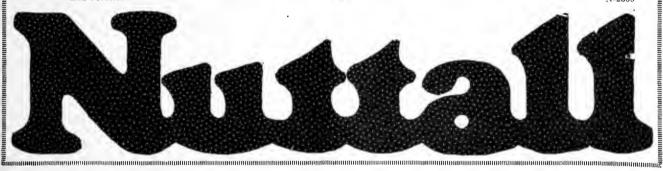
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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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protect ALL the fares for the reason that they accommodate any rate of cash fare and any kind of ticket.

Ask for particulars

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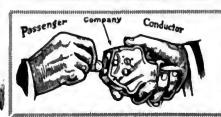
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Direct
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USE LE CARBONE CARBON BRUSHES

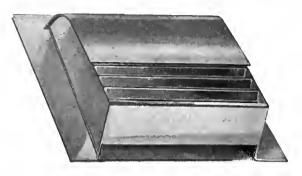
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MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campalgns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-499, Elec. Raliway Journal, Leader-News Bidg., Cleveland, Ohio.

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is read by men whose success depends upon thorough knowledge of means to an endwhether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are you using the Searchlight Section?

January 13, 1923
Electric Railway Journal

SEARCHLIGHT SECTION



Brill Railway Omnibus Gasoline Driven with Trailer



To be offered with other railway equipment at two Virginia Auctions to be held right away

Omnibus is mounted on Mack chassis and capable of seating 30 persons. Body size 22 ft. x 8 ft. Heated by by-pass from engine exhaust. Electric lights and standard trolley car equipment. Weight 12,000 lb. Chassis equipped with pivotal front truck having four wheels, 4 ft. 8½ in. gauge, AERA flanges and brakes and usual specifications for 5½-ton Mack truck.

Trailer accommodates 35 persons. Body mounted on Brill Standard Trailer and equipped the same as power unit except that body is not heated. Units when coupled have maximum speed of 15 miles per hour, take 3% grade and a curve of 30 ft. radius.

This equipment is included in the Auction to be held at Camp Humphreys, Va., Jan. 19th. Other material of interest to the electric railway field will be offered at this sale—such items as Gasoline Speeders, both 60 cm and standard gauge; Car Wheels, mine service; Circuit Detectors; Mortar Trucks and Cars; Gun Trucks and Cars, 60 cm gauge. Catalog of this sale

may be obtained from Commanding Officer at Camp Humphreys or Q. M. Supply Officer, Gen. Intermediate Depot, 1st Ave. and 59th St., Brooklyn, N. Y.

At Camp Jackson, S. C., Jan 26, such offerings as Folding Canvas Cots; Post Caps; Iron, flat, round. and strap; Office Furnishings and Hardware will be auctioned Catalog of this sale may be procured from Commanding Officer at Camp Jackson or Commanding Officer, Q. M. Intermediate Depot, Atlanta, Ga.

On Jan. 30th., at Norfolk, Va., the following items, among others, will be auctioned: Office Safes; Steel Cots; Guy Anchors; Chain; Rivet Sets; Transformers; Iron, bar, flat and round; Electric Motors; Hardware, all kinds; Metal Reflectors; Wire Pliers; Rivets, asstd; Porcelain Insulators; Machine Bolts; Screws, large asstd.; Steel Squares, asstd. For catalog write Commanding Officer at Norfolk, Q. M. Intermediate Depot or Q. M. Supply Officer, Gen. Intermediate Depot, 1st Ave. and 59th St., Brooklyn, N. Y.

The Government reserves the right to reject any or all bids.



WAR DEPARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car Collier, Inc., Barron G. Air Beceivers, Aftecoolers Ingersoll-Rand Co. Ingersoil-Band Co.
Anchars, Guy
Electric Service Sup. Co.
Ohio Brasa Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co. Automatic Return Switch Standa Ramapo Ajax Corp. Antomatic Safety Switch Standa Ramapo Ajax Corp. Axles Bemis Car Truck Co. Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J G.
Carnegie Steel Co.
Westinghouse E. & M. Co. Axla Straighteners Columbia M. W. & M. I. Co. Rabbitt Metal More-Jones Br. & Metal Co. Babbitting Devices Columbia M. W. & M. I. Co. Sadges and Buttons Electric Service Sup. Co. Internat'l Register Co., The Batterles, Dry National Carbon Co. National Carbon Co.
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbis M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Le Grand, Inc., Metal Co.
Westinghouse E. & M. Co. Bearings, Center and Roller Side Stucki Co., A. Bearings, Boller Stafford Roller Bearing Car Truck Corp'n Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co. Bollers Babcock & Wilcox Co. American Steel & Wire Oo, Electric Service Sup. Co. Indianapolis Switch & Frog Co. Obio Brass Co. Rail Welding & Bonding Co. Railway Track-work Co. American Steel & Wire Co. Electric Service Sup. Co. General Electric Co. Indianapolis Switch & Prog. Co. Ohlo. Bress. Co. Co.
Ohlo Brass Co.
Rail Wolding & Bonding Co.
Rail Wolding & Bonding Co.
Rail Wolding & Bonding Co.
Westinghouse E. & M. Co.
Brackets and Cross Arms
(Nen also Poles, Ties,
Posts, etc.)
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohlo Brass Co.
Braks Adinates. Brake Adjusters National Ry. Appliance Co. Westinghuose Tr. Br. Co. Sational My. Appliance Co. Westinghubos Tr. Br. Co. Brake Shres Amer. Br. Shoe & Fdry Co. Barbour-Stockwell Co. Bernis Car Truck Co. Brill Co. The J. O. Columbia M. W. & M. I. Oo. Brakes, Brake Bystems and Brake Parta Allis-Chaimera Mfg. Co. Bernis Car Truck Co. Bernis Car Truck Co. Brill Co. The J. G. Columbia M. W. & M. I. Co. General Electic Co. National Brake Co. Westinghouse Tr. Br. Co. Brooms, Truck, Steel or Battan Amer. Ratian & Reed Mfg. Co. Brushes, Carbon.

Co
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
National Carbon Co.
Westinghouse E. & M. Co.

Brushes, Graphits Morganite Brush Co. National Carbon Co.

Brushes, Wire Pneumatic Ingersoll-Rand Co. Brush Holders Anderson Mig. Co., A. & Anderson Mig. Co., A. & J. M. Columbia M. W. & M. I. Co Buses, Motor Brill Co., The J. G. Bushings Nat'l Fibre & Insulation Co. Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cables (See Wires and
Tables) Cambric, Tapes, Yellow & Black Varnished Irvington Varnish & Ins. Co. Carbon Brushes (See Brushes Carbon) Car Lighting Fixtures Elec. Service Supplies Car Panel Safety Switches Consolidated Car-Heating Co. Westinghouse E. & M. Co. Cars, Dump Differential Steel Car Co. Cars, Passenger, Freight Express, Rtc.
Amer. Car Co.
Hrill Co. The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
Wason Mfg. Co. Cars, Second Hand Electric Equipment Co. Cars, Self-Propelled General Electric Co. Castings, Brass, Composition or Copper Anderson Mfg. Co., A. & J. M. Columbia M. W. & M. I. Co. More-Jones Br. & Metal Co. Castings, Gray Iron and Steel Bemis Car Truck Co. Columbia M. W. & M. I. Co. Castings, Malleable and Brass Amer. Brake Shoe & Fdry. Co. Bemis Car Truck Co. Columbia M. W. & M. I. Co. Le Grand, Inc., Nic Catehers and Retrievers, Trolley Electric Service Sup. Co. Ohio Brass Co. Wood Co., Chas. N. Catenary Construction Archbold Brady Co. Clernit, Howkers. Archbold Brady Co.
Circuit Breakers
General Electric Co.
Westinghuso E. & M. Co.
Clamps and Connectors for
Wires and Cables
Anderson Mfg. Co., A. &
J. M.,
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohlo Brass Co.
Westinghouse E. & M. Co.
Cleaners and Serapers— Cleaners and Serapers—
Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co. The J. G.
Ohlo Brass Co.
(Business and Co.) Clusters and Sockets General Electric Co Coal and Ask Handling (See Conveying and Hoisting Machinery) Coll Banding and Winding Machines Columbia M. W. & M. I. Co Electric Service Sup. Co. Colla, Armature and Field Columbia M. W. & M. I. Co. Economy Elec Devices Co. General Electric Co. Roma Wire Co.

Colls, Choke and Kicking General Electric Co. Westinghouse E. & M. Co

Coin-Counting Machines Electric Service Sup. Co Internat'l Register Co. Johnson Fare Box Co.

Commutator Slotters Electric Service Sup. Co. General Electric Co. Westinghouse E & M. Co.

Commutator Truing Devices General Electric Co

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co. Compressors, Air Allis-Chalmers Mfg. Co. General Electric Co. Ingersoil-Rand Co. Westinghouse Tr. Br. Co. Compressors, Air, Portable Ingersoil-Rand Co. Condensers Allis-Chalmers Mfg. Co. General Electric Co. Ingersoll-Rand Co. Westinghouse E. & M. Co. Condensor, Papers Irvington Varnish & Ins. Co. Connectors, Solderiess Westinghouse E. & M. Co. Connectors, Trailer Car Consolidated Car-Heat's Co. Electric Service Sup. Co. Obto Brass Co. Obio Brass Co.

Controllers or Parts
Allis-Chalmers Mig. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co. Controller Regulators Electric Service Sup. Co. Controlling Systems
General Electric Co.
Westinghouse E. & M. Co. Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co. Conveying and Hoisting Ma-chinery Columbia M. W. & M. I. Co. Cooling Systems
Spray Engineering Co.
Copper Wire
Anneonda Copper Min. Co. Cord Adjusters Nat'l Fibre & Insulation Co. Cord, Bell, Trolley Begistee, etc.
Brill Co., The J. G.
Electric Service Sup. Co.
Internst'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Silver Lake Co. Card Connectors & Couplers Electric Service Sup. Co. Samson Cordage Works Wood Co., Chas. N. Conplers, Car Rrill Co., The J. G. Ohlo Brass Co Westinghouse Tr. Br. Co. Cranes
Allia-Chalmers Mfg. Co. Cross Arms (See Brackets) Crossings Ramapo Ajaw Corp. Cressing Foundations International Steel Tie Co Crossing Frog & Switch Ramapo Ajax Corp. Wharton, Jr., & Co., Wm. Crossing Manganese Indianapolis Switch & Frog Ramapo Alax Corp. Crossing Signals (See Sig-nals, Crossing) Crossings Track (See Track) Special Work) Crossings, Trolley Ohio Brass Co. Crushers, Rock Allis Chalmers Mtr. Co. Curtains and Curtain Pixtnes and Currain
Fixtnes
Brill Co, The J. G
Electric Service Sup Co
Merton Mfg. Co.
Dealers' Machinery
Electric Equipment Co. Derniling Devices (See Track Work) Deraiting Switches Ramapo Ajax Corp. Destination Bigns Columbia M. W. & M. I. Co. Electric Service Sup. Co. Detective Service Wish Service, P Edward

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Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.

Doors and Door Fixtures Brill Co., The J. G. General Electric Co Doors, Folding Vestibule Nat'l Pheumaue Co., Inc. Braft Rigging (See Conplers) Drills, Rock Ingersoll-Rand Co. Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoil-Rand Co.
Ohio Brass Co. Dryers, Sand Electric Service Sup. Co. Ears Ohio Braes Co. Electrical Wires and Cables Amer. Electrical Works American Steel & Wire Co Roebling's Sone Co., J. A. Co. Electric Grinders Railway Track-Work Co. Electrodes, Carbon Indianapolis Switch & Frog Railway Track-Work Co. Electrodes, Steel Indianapolie Switch & Frog Co.
Railway Track-Work Co. Engineers Consulting Contracting and Operating Allison & Co. J. R.
Andrew, Sangster & Co. Archbold-Brady Co. The Beeler John A.
Byllesby & Co., H. M.
Day & Zimmermann Feustel, Robert M.
Ford, Bacon & Davis Hemphill & Wells Holst, Englehardt W.
Jackson, Welter Kelly, Cooke & Co.
Ong, Joe R.
Pareons, Klapp, Brinkerhoff & Douglas Richey, Albert S.
Robinson & Co., Inc., Dwight P.
Sanderson & Porter Smith & Co., C. E.
Stone & Webster White Engineering Corp., Tho J. G.
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Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
National Ry. Appliance Co.
Fences, Woven Wire and
Fence Posts
American Steel & Wire Co. Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fore Box Co.
Consolidated Car Fender Co
Electric Service Sup. Co.
Le Grand, Inc., Nie Fibre and Fibre Tubing
Nat'l Fibre & Insulation Co.
Westinghouse E. & M. Co. Field Colls (See Colls) Flooring Composition Amer. Mason Safety Tread Co. Forgings Carnesie Steel Co. Columbia M. W. & M. I. Co Hose, Bridges Chio Brass Co Proga & Crossings, Tee Rail Ramapo Ajax Corp. Frogs, Track (See Track Work) Wharton, Jr., & Co., Wm. Froga, Trolley Ohio Brass Co. Fuses and Fuses Boxes Columbia M. W. & M. I. Co Consolidated Car-Heating Co General Electric Cu. Westinghouse E. & M. Co. Williams & Co., J. H. Fuses, Refiliable Columbia M. W. & M. I. Co. General Electric Co. Gages, Gil and Water Ohio Brass Co.

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Economy Electric Devices
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Gates, that
Brill Co., The J. G.
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Carnesce Steel Co.
Gear Cases
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Co. Co. Nuttall Co., R. D. Tool Steel Gear & Pinion Generating Sets, Gas-Electric General Electric Co. General Electric Co.
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Westinghouse E. & M. Co.
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Electric Service Sup. Oo.
Ohlo Brass Co.
Ducksaws. Hacksaws Gladium Co., Inc. Hammers, Pneumatic Ingersoli-Rand Co. Harps, Trolley
Anderson Mfg Co., A. &
J. M.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., B. D.
Star Brase Works Nuttall Co., R. D.
Star Brass Works

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General Electric Co.
Ohio Brass Co.
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Consolidated Car Heating Co
Conomy Electric Devices
Co.
Goid Car Heating & LightIng Co.
National Ry. Appliance Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and
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Smith Heater Co., Peter
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Co.
Rollway Track-Work Co. Indianapolie Switch & Flor Co. Railway Track Work Co. Holsts and Lifts Columbia M. W. & M. I. Co Ford Chain Block Co. Ingersoll-Rand Co. Hydeanlie Machinery Allia-Chalmers Mfg Co. Industrial Co-ordination Shemian Service, Inc. Instruments, Measuring and Recording Economy Electric Devices Co. Electric Service Sup. Co. General Electric Co. Westinghouse E. & M. Co. Westinghouse E. & M. Co.
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Diamond "S" Steel Back is the Best Type



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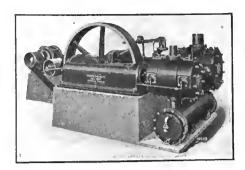
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D-67 for Narrow Treads D-87 for Wide Treads



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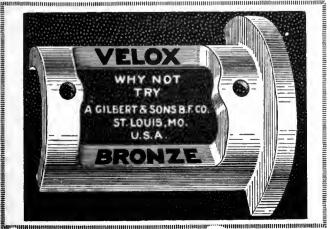
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Insulator Pins
Electric Service Sup. Co.
Ilubhard & Co.
Insuracce, Fire
Marsh & McLennan
Jacks (See also Crones,
Iloists and Lifts)
Buckeyo Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
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(See Rail Joints)
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Brill Co., The J. G.
Janetion Boxes

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Labor Adjusters
Corp. Service Bureau, The Lamp Guards and Fixtures Anderson Mfg. Co., A. & J. M. Electric Service Sup. Co. General Electric Co. Westinghouse E. & M. Co.

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Westinghouse E. & M. Co.
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Ohio Brass Co.
Lanterns, Classification
Nichola-Lintern Co.

Lightning Protection Anderson Mfg. Co., A. & J. M. Andrian A. S. J. M. J. M. Electric Service Sup. Co. General Electric Co. Ohio Brass Co. Westinghouse E. & M. Co.

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Galena Signal Oil Co.
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Intratingualist Corp.

Co., Bamapo Ajax Corp.

Wharton, Jr., & Co., Wm.

Meters (See Instruments)
Meters, Car., Watt-Hour
Economy Electric Devices
Co

Motor Bases (See Ruses, Motor) Motormen's Seats Brill Co. The J. G. Electric Service Sap. Co. Wood Co., Chas. N.

Meiora, Electric Allis Chalmers Mfg Co. Westinghouse E. & M. Co.

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Barbour-Stock well Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Olis (See Lubricants)
Packing
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Amer. Br. Shoe & Fdry. Co.

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General Electric Co.
Wood Co., Chas. N.

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Pipe Fittings
Westinghouse Tr. Br Co.
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Plates for Tee Rail Switches
Ramapo Ajax Corp.
Pilers—Rubber Insulated
Electric Service Sup. Co.
Ingersoil-Rand Co
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Hubbard & Co.
Pole Line Hardware Ohio Brass Co.
Poles, Metal Street
Bates Exp. Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.

Poles, Trolley
Anderson Mfg. Co., A. &
J. M. Anderson Mfg. Co., A. & J. M. Co. Electric Service Sup. Co. Nuttall Co., R. D. Poles, Tubular Steel Electric Ry. Equip. Co. Electric Ry. Equip. Co. Electric Service Sup. Co. Poles and Tles, Treated International Creosoting and Construction Co.

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Effective Service Sup. Co.

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International Reg. Co., The
Rooke Automatic Reg. Co. Reinforcement, Concrete American Steel & Wire Co Carnegge Steel Co

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Repair Work (See also Colis) Columbia M. W. & M. I. Co. General Electric Co. Westinghouse E. & M. Co. Replacers, Car Columbia M. W. & M. I. Co. Electric Service Sup. Co.

Electric Service Sup. Co
Resistance, Grid
Columbia M. W & M. I. Co.
Resistance, Wire and Tabe
General Electric Co
Westinghouse E & M. Co.
Resistances
Consolidated Car-Heating Co.
Retrievers, Trolley (See
Catchers and Retrievers.
Trolley)

Rheustats
General Electric Co.
Westinghouse E. & M. Co.

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Truck Corp.

Sanders, Track
Brill Co., The J. G
Columbia M. W. & M. I. Cu.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohlo Brass Co.
Sash Flatures, Car
Brill Co., The J. G.
Serapers, Track (See Cleaners and Scrapers, Track)
Screw Privers, Rubber Insulated
Electric Service Sup. Co.
Seating Materials
Brill Co., The J. G.
Senis, Car (See also Rattan)
Amer. Rattan & Reed Mfg.
Co.

Co.
Brill Co., The J. G.
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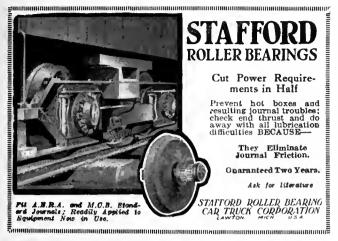
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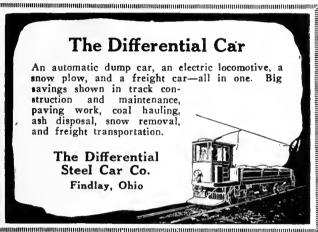
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ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
A Ailis-Chalmers Mfg. Co	Electric Equipment Co 34 Electric Railway Equipment Co. 29 Electric Service Supplies Co 9	Kelly, Cooke & Co	Robinson Co., Dwight P
American Electrical Works 28 Amer. Mason Safety Tread Co., 40		Le Carbone Co	S
American Rattan & Reed Mfg. Co. 33 American Steel & Wire Co. 36 Anaconda Copper Mining Co. 29 Anderson Mfg. Co. A. & J. M. 28 Andrew Sangster & Co. 17 Archbold-Brady Cn. 17 Arnold Co., The 16	Fenstel, Robt. M	Le Grand, Inc., Nic	Samson Cordage Works 40 Sanderson & Porter 16 Searchlight Section 34 Shephard Elec. Crane & Holst 24 Co. 24 Sherman Service Co. 12 Sliver Lake Co. 33 Smith & Co., C. E. 16 Smith Heater Co., Peter 39
	Galena-Signal Oil Co	Nachod Signal Co., Inc 29	Spray Engineering Co 32 Stafford Roller Bearing Car
Babeoek & Wilcox Co. 31 Barbour-Stockwell Co. 30 Bates Expanded Steel Truss Co. 28 Beekwith Chandler Co. 33 Besiter, John A. 166	Gilbert & Sons, B. F. Co	Nachold Signal Co., Inc. 29	Truck Corp'n 39 Slandard Underground Cable Co 29 Slar Brase Works 37 Stone & Webster 16 Stucki & Co. A 40
Bernis Car Truck Co	"Help Wanted" Ada	New York Switch & Crossing Co. 30 Nichols-Lintern Co. 33 Nuttail Co., R. D. 27	Texas Co
bylievoy & Co., H. M	Hoist Englehardt, W 16 Hubbard & Co	0	U
С	1	Ohio Brass Co	U. S. Electric Signal Co 29 Universal Lubricating Co 31
Cameron Electric Mfg. Co 39 Carnegie Steel Co 25	Indianapolis Switch & Frog Co. 31	P	v
Cleveland Fare Box Co 32	Ingersolf-Itand Co	Parsons, Klapp, Brinckerhoff &	Vacuum Oil Co Front Cover
Collier, Inc., Barron G	struction Co	Douglas	Wanl" Ads. 34 War Department 35 Wason Mfg. Co. 41 Westinghouse Elec. & Mfg. Co. 2 Westinghouse Traction Brake Co. 4 Wharton Jr. & Co., Wm. 30 White Engineering Corp., The
Daw & Zimmurman Co. Inc.	Jackson, Walter	Rathway Utility Co 39	J. G
Differential Steel Car Co 39	Jeandron, W. J	Richey, Albert S	Wish Service, The P. Edw. 17 Wood Co., Chas. N. 20



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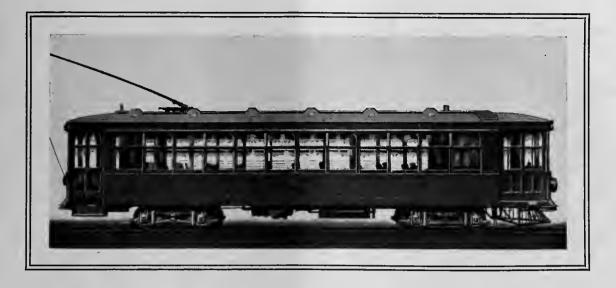
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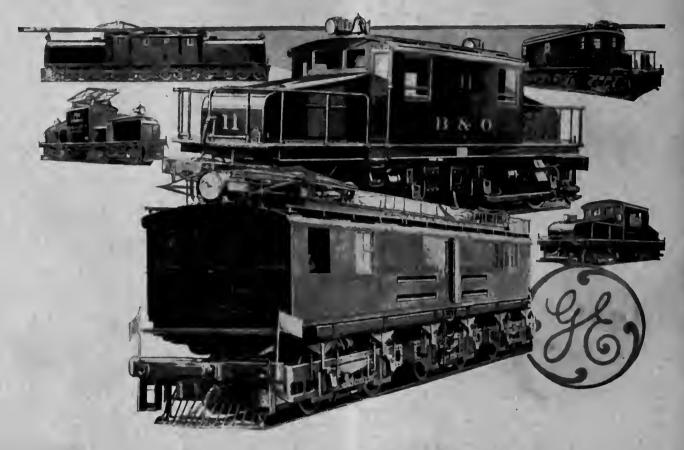
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CONTENTS

Maintaining Electric Railway Motors
Particular care should be used when replacing field coils to insure that they are connected properly and that correct polarity is obtained. Various methods for testing are given.
Boiler House Extension at Boston
Features of 1922 Trackwork in Rochester
Reducing Lubrication Costs
Nitrogen-Filled Transformer Case122
The Readers' Forum
Equipment Maintenance Notes
New Equipment Available
Association News and Discussions
Results Obtained with High-Speed, Light-Weight Interurban Cars
Governor Smith's Recommendations Criticised
A Foreman's Relation to His Men and His Company137 By F. G. Buffe. An analysis of the qualifications needed in a successful foreman, together with some observations on the advantages of employment with an electric railway company.
American Association News
The News of the Industry
Traffic and Transportation142
Financial News
Personal Mention147
Manufactures and the Markets

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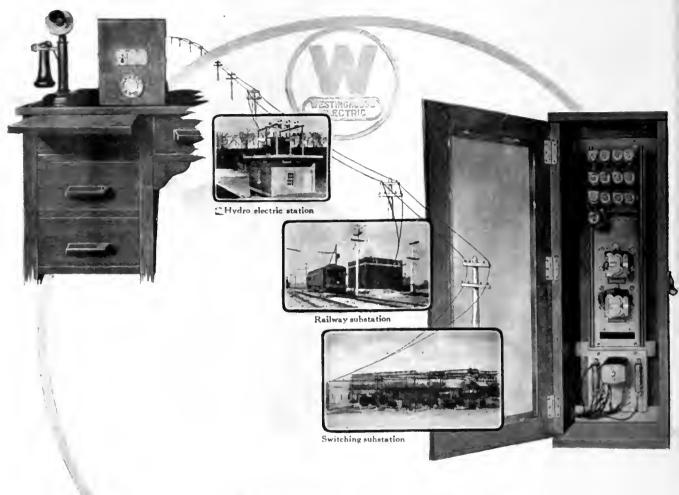
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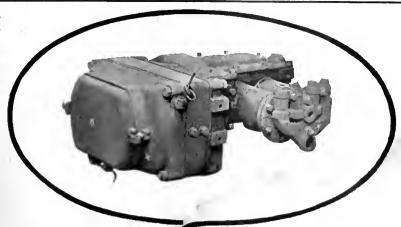
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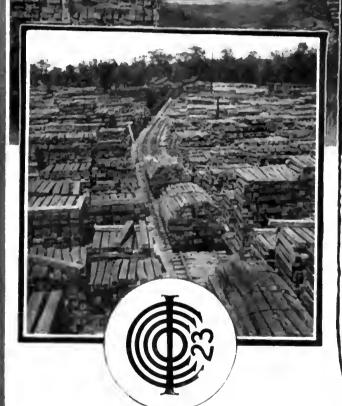
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The foundation of International Tie Service is built on the production of sound, durable ties of uniform size in strict accordance with A. R. E. A. grades, and to keep on hand well selected ties, ready for your check inspection.

We are now and have for many years past served and saved money for executives and engineers of discernment.

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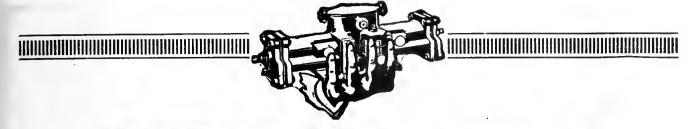
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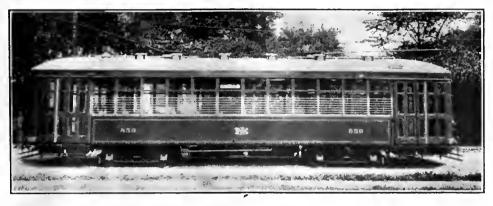
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By far the biggest part of the cost of repairing a rail joint is in tearing away and relaying the pavement.

Now is the time to do this work--your maintenance men are available and Dayton Joint Boosters cost only \$4.50 each. Send us your order and put your men to work.

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Hereafter I'll use Dayton Resilient fot

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I'll tell the world too that I'm a booster for Dayton Resilient Joint Boosters.

For years I've been spending money, every six months or so, in making temporary repairs and the outlay has never justified the layout.

I'm satisfied now that Joint Boosters will add many years of life to our track and save us further track and paving repairs.

Let us send you complete information and proven results.





Look closely at this photograph. It is the ALL COPPER UNA RAIL BOND—the rail bond that has met the approval of many maintenance of way engineers all over the country because it is a big step forward in rail bonding.

One head is shown before being welded; the other head has been welded to the rail and sawed to show the solidity of the head and the complete union of every individual bond strand in the head.

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The service of electric railway companies can be "trademarked" in the same way.



The Beckwith-Chandler Company makes finishes for brush or spray application—flat color and varnish systems, enamel systems and color varnish systems—for street railway car interiors and exteriors.

Bright finishes that stay bright

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These things the Beckwith-Chandler Company offers to electric railways. We have a real interest and extensive experience in increasing riders through the use of paint. Let us help you to increase traffic. Ask now to be put in touch with electric railway men who know our products and our service, because they use them.

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THE THERMOSTAT IN THE GLASS CASE

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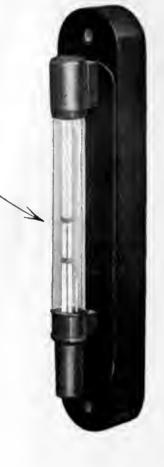
The Consolidated Visible Thermostat not only controls the heating system; it acts as a telltale on its proper functioning. The mercury column is a visible check that motorman, conductor, or inspector can take in at a glance. Should the Thermostat itself be damaged from any cause, the damage which was hitherto hidden by the metal cover becomes immediately manifest. Any attempt to tamper, whether through ignorance or maliciousness, is instantly revealed.

This thermostat operates within very close limits of temperature change. It keeps the car at uniform heat, taking full advantage of moderating weather, crowded cars and other conditions which are promptly reflected in reduced current consumption.

The mounting gives complete stability and firmness yet absorbs without damage, all the shocks and vibrations of street car service.

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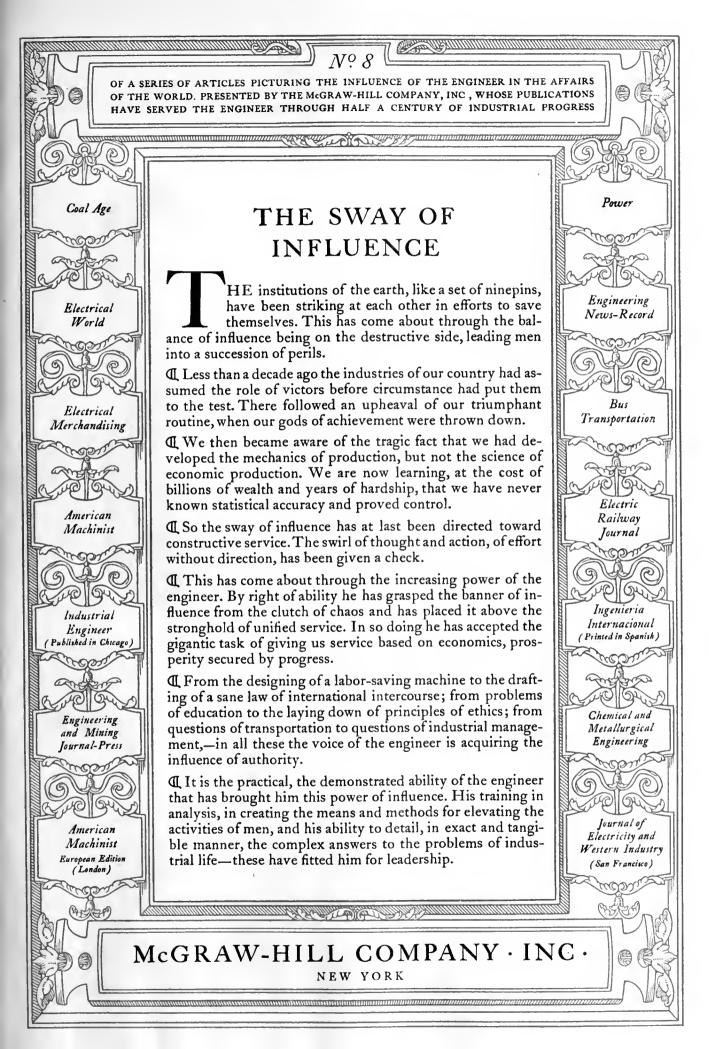


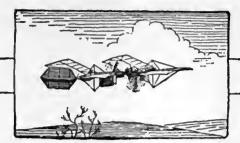


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MODEL IN FLIGHT

"The way of an Eagle in the air"



ENTURY after century men broke their necks trying to fly. They had not troubled to discover

what Solomon called "the way of an eagle in the air."

In 1891 came Samuel Pierpont Langley, secretary of the Smithsonian Institution. He wanted facts. His first step was to whirl flat surfaces in the air, to measure the air pressures required to sustain these surfaces in motion and to study the swirls and currents of the air itself. Finally, in 1896, he built a small steam-driven model which flew three-quarters of a mile.

With a Congressional appropriation of \$50,000 Langley built a large man-carrying machine. Because it was improperly launched, it dropped into the Potomac River. Years later, Glenn Curtiss flew it at Hammondsport, New York.

Congress regarded Langley's attempt not as a scientific experiment but as a sad fiasco and

refused to encourage him further. He died a disappointed man.

Langley's scientific study which ultimately gave us the airplane seemed unimportant in 1896. Whole newspaper pages were given up to the sixteen-to-one ratio of silver to gold.

"Sixteen-to-one" is dead politically. Thousands of airplanes cleave the air—airplanes built with the knowledge that Langley acquired.

In this work the Laboratories of the General Electric Company played their part. They aided in developing the "supercharger," whereby an engine may be supplied with the air that it needs for combustion at altitudes of four miles and more. Getting the facts first, the Langley method, made the achievement possible.

What is expedient or important today may be forgotten tomorrow. The spirit of scientific research and its achievements endure.





Lubrication is of Extreme Importance

EXECUTIVE officers of electric railways are awakening to the fact that lubrication is not only a determining factor in securing efficient service from power house and rolling equipment, but that many other important expense items are regulated largely by its quality.

The installation of efficient lubrication on your road is not the simple proposition of buying oil, nor does the purchase of cheap oil indicate economy in lubrication—in fact, quite the reverse.

Service is the one unfailing test of oil quality. Unless the lubricant is capable of demonstrating efficient service, it is dear at any price. And SERVICE is not a difficult quantity to measure—it shows in performance.

The subject is one worthy of careful consideration. The mechanical and

operating departments — as well as the purchasing—are interested, and in a position to judge service values at first hand. Their opinion is indispensable to intelligent selection.

Lubrication costs will be found high or low, exactly in proportion to the service results obtained. With the inevitable poor service that marks the use of cheap oils, the small savings made through their lower first cost is lost many times over in the expenses of repairs and depreciation caused by their shortcomings.

When the lubrication question is considered from all angles — when efficient service and ultimate economy are the deciding factors — Galena Oils will be found the only logical choice. They are now used by over five hundred electric properties.

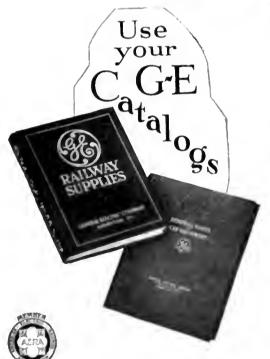
"When Galena Service Goes In Lubrication Troubles Go out!"



In 1923.

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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 61

New York, Saturday, January 20, 1923

Number 3

Are You Maintaining an Asylum for Antiquated Machinery?

EVEN a casual inspection of almost any electric rail-way shop will disclose the presence of some machines that ought to have been junked long ago. They are kept partly as a recognition of their excellent past record and partly because the wastefulness of continuing them in service indefinitely is not clearly recognized. The fact is that many machines, purchased for work which at the time they could do economically, are now entirely obsolete. An unprejudiced critic, coming on a property from the outside, could easily point out the offenders, if the local master mechanic is too close to the job to enable him to do so.

Great progress has been made within a few years in the design of machines for performing the routine and special operations which go into electric railway maintenance shop work. This is lost to the property which is still depending upon machinery purchased ten or twenty years ago. A profitable task for some one on most any property would be to make a study of the advances in this line that have been made. The exhibits held in connection with the electric railway and steam railroad conventions are of great value in this connection. A visit to a really up-to-date shop is always stimulating.

An effort will be made in the special monthly issues of the JOURNAL to direct attention to the best methods of performing all mechanical operations which are involved in maintenance work.

Modern Track and Line Maintenance Methods Involve the Use of Good Tools

HE danger of becoming a repository for obsolete machines is not confined to the shop, by any means. The same principle applies on the track and line. There is some kind of a machine, and in many cases there are several kinds, for the performance of every routine mechanical operation. Inventors and manufacturers have been stimulated lately to produce such machines in profusion on account of the high cost and scarcity of skilled labor. As R. H. Dalgleish wrote, in his "New Year's message" in the issue of this paper for Jan. 6, page 14: "The use of labor-saving tools has done more, in the engineering field, to increase output than anything else that I can recall." He had the track in mind particularly, but this statement is true throughout the whole range of maintenance work.

If one wishes to realize vividly the changes which have been going on in this line recently let him but contrast the present-day methods of cutting out worn rail, building up joints, eliminating rail corrugations and other irregularities, drilling rail, mixing concrete, tamping ties, replacing trolley wire, etc., with the procedure of only a few years ago. The result is amazing,

and more amazing still is the slight investment cost involved in the machines that do this work as compared with the savings produced. The estimates of expenditure for 1923 which were published in this paper two weeks ago indicate a wonderfully active year in rehabilitation. It behooves the maintenance men to insure the maximum return on every dollar by judicious recommendations to the boss to purchase the labor-saving machines.

Carry the Question Mark in Your Mind During 1923

A QUERYING attitude on the part of any individual, and especially on the part of a man connected with a large organization like an electric railway, is something to be encouraged. It would be a good idea at this outset of a new year for every one of us to resolve that we will take this attitude toward all elements of our work in order that we may be sure that we are getting the best out of it.

Most of us seem to go on the assumption that because the things we are doing have been done that way for a considerable time with a fair degree of success, it is all right still to go along in the old ruts. It takes a jolt sometimes to make us change our ways or wonder if it is about time they were changed. This is perfectly natural. All human beings are characterized by mental inertia. We are not so much to be blamed for not being more alert as we are to be pitied. The alert fellows are the ones who are getting along, and the alert ones are those who are always asking questions.

The fellow who looks at every practice on his own property, in the light of what he learns is being done on other properties, with a question in his mind is not likely to go to sleep on his job. He will be getting up new schemes all the time, some of which will be worth while and will make real savings. It goes without saying that if a practice on one's own property is good, it will stand questioning; if it is not good, the sooner this fact is appreciated the better. Similarly, when some other company seems to have a practice that is getting results, it is a fair question whether that practice cannot be applied at home.

Now, it is not a wise plan to be always changing methods, just for the sake of having a change. Some people are restless and are not satisfied to go along in the old way even if they know it to be the best one. However, one can maintain a questioning attitude toward everything without being constantly in the process of change. Would it not be well during the coming year, even if it is a little late for New Year's resolutions, to determine definitely that nothing will be accepted as best just because it has been doing the work for a long time, but that everything will be weighed to determine the possibility of improvement?

Drawing Ideas from the Shop Employees

Many wide-awake companies spend considerable money in the quest of ideas by sending delegations to inspect other properties. It is usually a profitable investment, but too often the same open-minded spirit does not permeate the whole organization, and some heads of departments actually resent any approach by a subordinate who claims he has an improved method for accomplishing a given result.

This latter criticism does not apply to the master mechanic of a certain interurban who has been successful in encouraging very helpful suggestions from his shop foremen and other shop employees. This master mechanic, who believes that 90 per cent of his job is to get the best work possible from his employees, explained that one must ever be in a receptive frame of mind for shop kinks, suggestions, etc. When a scheme is recognized as useful, the man who suggested it should be helped in perfecting it. In other words, his interest must be held by allowing him to work the thing out to a success. A pride is thereby created and incentive is not dulled but sharpened. This master mechanic's advice, in short, was: "Don't suppress experimentation on the part of shopmen. Encourage inventiveness, but give the men all the credit for any successful development." The fruits of this policy were then demonstrated when various improvements and developments were described to the JOURNAL representative by those who had conceived and perfected the ideas.

Aside from value or usefulness of any article so developed, its originator feels a great confidence in his ability and is spurred on by any success, however small, to produce other time and labor saving methods or devices. Besides, more common ground and better understanding is established between the master mechanic and his men.

Figures that Don't Mean What They Say

IT HAS BEEN noticeable recently that whenever the cost of lubrication has been discussed attention has been focused chiefly on the cost of the oil used, plus, perhaps, the labor expense of its application. However, it must be remembered that the effectiveness of equipment lubrication, not its cost, is the factor controlling maintenance expenditures, and the amount of the latter is often increased by a decrease in the direct lubrication expense. A case is recalled where the president of a large railway noticed a statement made by the superintendent of equipment of a near-by property giving very low unit lubrication costs; in fact, about onequarter of those of the large city system. Such a potential saving was considered worthy of investigation, but the answer turned out to be in the higher charges in the other important items largely controlled by the quality of rolling stock lubrication. In other words, the higher unit cost for lubrication on the larger property was more than justified by better performance.

On this basis, what are all the factors that enter into a comparison between two methods of lubrication or two kinds of lubricant? If the effectiveness of each is measured by service and low cost of all items affected by the quality of lubricants, should not these factors be included in a fair economic comparison? Cost of lubricant and labor to apply it, of rewinding armatures damaged because of burned-out bearings, of

pull-ins, and bearing life, all on a mileage basis. These were included in the analysis made by those digging into the low figures in question, and they found a quadrupled expense for the lubrication cost alone was more than wiped out by the economies in other dependent items.

Stimulating Interest in Maintenance Work

KEEPING equipment going after it is built is not nearly as interesting as building it. Every one likes to see the results of his work, which is rather difficult to do when this work consists of such routine operations as repacking bearings with waste, adjusting brake rigging, slotting commutators, tightening track bolts, splicing trolley wire, etc. One bearing, brake rigging, commutator, track joint or trolley splice seems just like another. But there is a way to overcome the tendency toward monotony or disinterest on the part of the employees who do routine maintenance jobs. The work can be made interesting by letting the men know the results they are producing in comparison with other men on similar work.

The problem of stimulating interest differs with the size of the property. On a small railway the master mechanic, the line superintendent and the roadmaster know their men personally and can do a great deal without much organization if they want to. For example, on one property where about seventy-five cars are given light overhauls in a division shop, the master mechanic divides his ears into groups, assigning each to a crew for inspection and small repairs. Each month records are posted showing the pull-ins of the cars of each group and the kinds of defects which have been remedied. These indicate whether thorough inspection work is being done, and promote a spirit of team competition. In other words, the same idea which is back of a baseball team, impelling it to win, that is, the sporting instinct, is utilized to make interesting what might otherwise be humdrum effort.

Obviously, when men have a zest for their work they not only enjoy it but they do it better. This means not only reduced maintenance cost but, in the end, better jobs for the workers.

On large properties more organization is needed to accomplish results like those which are easier to get on small ones, but the same principles apply. The plan followed by steam railroads in recognizing good track maintenance work by sections has given excellent results. An award is taken as a great honor and the men on the "prize section" keep every traveler over it informed of the fact that he is having the privilege of riding on some high-grade track. Anything of this sort that will promote teamwork will bring good results, and the men will like it because it takes away something of the monotony of their tasks.

The large company has one advantage in that it is usually split up into operating lines, sections or divisions, with the carhouse as the operating center. A spirit of emulation can be easily developed by means of competition among these operating units, even if all are not favored with equally good equipment. Handicaps can be provided, if necessary, to equalize discrepancies in this direction.

But whether the company is large or small, it is "missing a big bet" if it is not stimulating its men to do their best by enlisting their interest.

Maintaining Electric Railway Motors

Particular Care Should Be Used When Replacing Field Coils to Insure that They Are Connected Properly and that the Correct Polarity Is Obtained—Various Methods for Testing Are Given

By J. S. Dean

Engineering Department Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

LL railway operators are vitally interested in making a good showing in their record of car-miles per car failure, for on this basis the management, in a general way, is able to judge the condition of the equipment and the efficiency of the shop organization. There are a number of things which affect this record such as collisions, poor condition of track and overhead construction work, rough handling and abuse of equipment by trainmen, severe operating schedules, etc., which are beyond the control of the master mechanic who is responsible for the upkeep of the equipment, and these factors should be given some consideration in connection with a study of this question. the other hand, if the equipment is left to run down by neglecting the details in connection with the electrical and mechanical repairs of the cars, there will be a noticeable increase in the number of car pull-ins with a consequent lowering of this record, to the discredit of the shop organization. With the thought in mind to assist operators in reducing their motor failures, which would in turn boost their record of car-miles per car failure, the following detail methods in connection with the upkeep and maintenance of railway motors are given for consideration:

During the general overhauling period, when the field coils are taken out of the frame to be cleaned, redipped in insulating paint or varnish and baked, or when damaged coils are replaced, it is very important to have them put back in the frame properly, with the leads so connected as to give the correct relative polarity, to secure the required magnetic flux. If for any reason one or more of the main field coils be connected so that the current passes through in the wrong direction, this motor will run at a higher speed, and when put on the car will tend to "hog" the load and result in overheating the armature. Should one or more of the commutating-pole coils be connected in wrong, the motor will commutate poorly and tend to flashover from brush-holder to brush-holder or from brush-holder to ground.

In order to prevent wrong connections, when frames are being overhauled or repaired, and to aid the operating man in connecting field coils to give satisfactory operation, a standard winding diagram of the motor being repaired should be obtained from the motor manufacturer and used as a guide in connecting the field coils.

PRECAUTIONS IN REPLACING FIELD COILS

The following points are well worth following while overhauling or repairing field windings:

- 1. Coils and frames should be cleaned and painted.
- Coils should be placed on poles properly.
 Coils should be spring supported and, where necessary, backed up by washers of either metal or fibrous material

well painted.
4. In replacing coils, the spring and washers should be

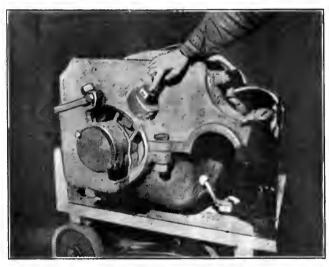
taped temporarily to the coil to keep them from working out of place and from getting in between the pole and pole seat when assembled.

5. The surface of the pole and pole seat should be cleaned to insure a good close fit when the bolts are drawn up

tightly.
6. The pole should never be pounded into place with a sledge, but a block of wood or a piece of soft metal, such as copper, should be used.

7. Pole bolts should be drawn up tightly and lock washers placed under each nut. White lead should be applied over the nuts after tightening to prevent entrance of water.

8. The assembled pole should be sounded by using a small hammer, to insure that it is drawn up tightly.



Westinghouse 101 Motor Modified to Take 101-B-2 Housings Using Two Radial Through-Bolts

9. Connections should be made as shown on the manufacturer's winding diagram.

10. The polarity of the assembled field coils should be checked carefully.

11. The connections between the coils with cable leads should be made by butting the ends together and then covering the joint with a copper sleeve and soldering well.

12. When the coils have terminals, the ends of the cable connected to the terminal should have a metal sleeve soldered to the wire. This in turn should be held in the terminal by screws securely tightened and locked.

13. The ends of the cables connected to the brush-holders should be provided with metal sleeves or terminals, securely clamped and locked to the brush-holder casting.

14. All wiring around the frame should be securely anchored to the frame and tied down to prevent vibration and to keep the insulation from being rubbed or cut by parts of the rotating armature.

15. Individual coils should be dipped and baked. To secure the best results, dip and bake the entire frame after the coils are in place and all connections are made.

16. The motor leads where they come out of the frame should be well protected by insulating bushings.

17. It is considered the best practice in connection with all modern railway motors and it is recommended for old motors to use cables coming out of the body of the coils instead of heavy brass terminals, to make the wiring connections around the frame. The main objection to the use of terminals is that they are more likely to break off, due

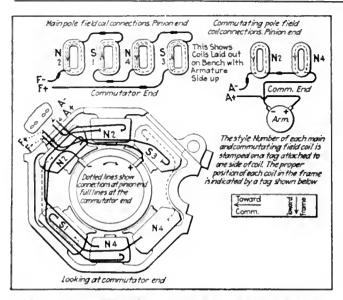


Fig. 1-Typical Field Winding Diagram for Rallway Motor

to vibration, or to develop a loose connection and burn off the lead. Another disadvantage is the difficulty of properly insulating the terminals after the connections are made.

The object of testing the polarity of field coils is to determine whether the main and commutating-pole field coils are properly connected. This test should be made whenever field coils are replaced, because coils are sometimes placed over the poles of the frame inverted or reversed, and wrong connections thus made show up in faulty operation of the motor. This test will show up conditions which might cause an armature to run hot due to an unbalanced magnetic field circuit caused by a reversed main field coil. It will also indicate conditions which might cause poor commutation and flashing in a commutating-pole motor because of a reversed commutating coil.

The testing circuit should be arranged as shown in Figs. 2 and 3. At least five or six sets of heaters or frames of resistors should be put in the circuit at first. If a readable deflection on the polarity indicator is not obtained, part of the grids should be omitted to increase the current. If one is available, an ammeter in the circuit will indicate whether the current is large enough to be liable to cause any damage to the windings or to connections.

A very satisfactory polarity indicator can be made from a piece of steel banding wire about 3 in. long, with one end bent over about 1 in. to distinguish it. This should be suspended at the middle by a short

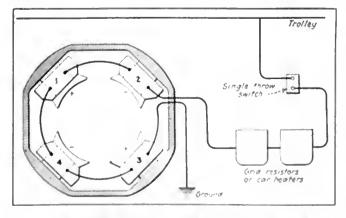


Fig. 2-Diagram of Connections for Polarity Test of Main Field Colls on Non-Commutating-Pole Motor

thread. When this is first used it should be held at the pole for at least one minute, when it will become magnetized, and it is then ready for use.

METHOD OF TESTING FOR POLARITY

The motor can be either on the trucks or out on the floor. It can have the armature in or out of the frame and, if a split-frame motor, it can be open or closed. With the coils all connected in series and the two field leads connected to the test circuit, as shown in Fig. 2, the switch is closed and current passes through the field coils, if they are connected properly. By holding the polarity indicator close to the ends of the coil, or to the pole stud bolts on the outside of the frame, the polarity indicator will reverse at alternate poles. Thus if No. 1 pole attracts the positive end of the polarity indicator, No. 2 should attract the negative end, No. 3 the positive end and No. 4 the negative end. If these conditions are not obtained the field winding connections should be changed.

If the frame to be tested has commutating poles, two separate tests should be made, one on the main field coils as previously described, and the other on the commutating-pole coils. This latter is made in the same manner, with connections as shown in Fig. 3. In this case only one of the motor leads (the negative armature lead) can be used, as the other lead from the commutating coils goes to one of the brush-holders. Fourpole railway motors with only two commutating coils, which are located directly opposite each other, also four-pole motors with three commutating coils, are tested in the same manner. In the case of the two-pole machine the polarity of both coils should be the same. while in the three-pole machine the two coils on diametrically opposite poles should be of the same polarity. while the intervening coil should have the opposite polarity.

In making the test the pivoted compass should be held in a horizontal position; or if a suspended polarity indicator is used this should be held by the free end of the suspension thread. All coils should be tested for polarity at the same end. Results should never be considered final until they have been checked the second time, as there is a possibility of the needle of the indicator having its polarity reversed. It is not necessary that a certain pole have a definite polarity (either positive or negative), but it is essential that the polarity of adjacent poles be different.

In the case of a commutating-pole machine, it is important to have the proper relation of polarity between the main and commutating field poles. To check this the negative armature lead of the motor should be connected to the positive field lead, the positive armature lead to the trolley side of the test circuit, and the negative field lead to the ground side of the test circuit. If the armature is in the frame and the brushes are making contact on the commutator, current will flow through all the windings. If the armature is not in the frame, then it will be necessary to short-circuit the brush-holders. With these conditions, the polarity of a main pole should be the same as the polarity of the commutating pole next to it in a clockwise direction when facing the commutator end of the motor.

When the two halves of a split-frame motor are bolted together for the machining of the housing fit, a liner of sheet steel about 0.017 in. thick should be placed at the split to insure a good clamping action on the housing when the two halves of the motor frames are bolted

together. During the overhauling period, or when motor troubles have developed and frames are opened up to take out the armatures, there is a possible chance of losing this clamping action in reassembling due to one or more of the following reasons: (a) Frame bolts not drawn up tight; (b) lock washers left off; (c) a poor grade of bolt used which will stretch; (d) dirt at the split of the motor frame.

Motors operating under the above conditions, due to the pounding action of the armature and hammer blows in passing over the rail joints, will soon develop considerable wear of the housings and housing seats, as well as at the tap bolts and tapped holes in the housings.

This trouble has been one of the main factors leading to the development of the present standard box-type motor. The use of housings that have a tight driving fit in the ends of the solid frame has practically eliminated loose housings in railway motors. A number of methods for repairing loose housings in split frame motors, some temporary, others permanent, have been tried out on various properties and found to work out very satisfactorily.

Strips of canvas duck treated with white lead may



Through-Bolt Type of Housing Held by One Vertical Bolt

be placed on the worn housing, building it up to such a diameter as to insure a good tight clamping action of the two halves of motor frame when bolted together. In order to check whether the two halves of the frame of the motor are clamping the housings, it should be possible to get a 0.005 to 0.007 in. feeler between the frames at the split when they are bolted together with built-up housings in place.

Strips of advertising sign cards held in place by shellac are sometimes fastened to the worn housing, building it up to such a diameter as to insure a good tight clamping action of the two halves of the motor frame when bolted together. When the housing is not too badly worn, if made of malleable iron it can be huilt up by means of the electric or oxyacetylene welding process, after which it should be machined to fit the housing seat in the motor frame, plus enough allowance to insure a good tight clamping action of the two halves of the motor frame when bolted together.

The worn tap bolt holes should be bored out large and cast iron plugs (which have been found to give best results) should be driven tightly into these enlarged holes. The worn housings should be turned down and a steel ring about $\frac{2}{3}$ in. thick should be shrunk on the housing. If the housing has a double flange one of these must be turned off and a new flange made on the shrunk-on ring. It can then be turned down to such a diameter as to insure a good tight clamping action of the two halves of the motor frame when bolted

together. New holes should be drilled and tapped in the housing through the shrunk-on ring into the castiron plugs to receive the tap bolts.

BUILDING UP HOUSING SEATS ON MOTOR FRAMES

The housing seat in the motor frame may be built up by means of the electric or oxyacetylene welding process and then rebored to a smaller diameter to fit the worn housing (which should first be trued up), with enough allowance to insure a good tight clamping action of the two halves of the motor frame when bolted together. Another method is to bore out the housing seat in the motor frame and then to build this up by means of a semicircular steel liner, riveted in place, after which it should be welded at several points. The housing seats can then be rebored to fit the worn housings (which should first be trued up), with enough allowance to insure a good tight clamping action of the two halves of the motor frame when bolted together. Enough metal should be machined off at the split of both halves of the motor frame to insure a good tight clamping action on the worn housings of both halves of the motor frame when bolted together. When this



Through-Bolt Type of Housing Held by Two Radial Bolts

method is used it will be necessary to rebore the pole faces, to make certain that the correct air-gap is maintained.

In connection with the repairs on worn bearings, several good methods have been used to fix up the worn tap bolt holes. Sometimes a longer tap bolt is used which will engage the lower threads of the tapped holes in the housing that have not been damaged by the loose shorter bolts.

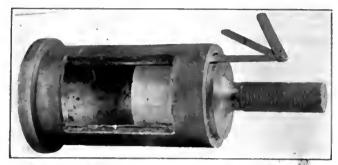
Another method consists of filling up the old worn holes by welding in (preferably Tobin bronze) and reboring and retapping new holes. The worn holes may be drilled out to a larger diameter, and a threaded steel plug welded at edges may be inserted. This plug should be drilled and tapped to take the standard size bolts. Worn holes may be retapped for the next larger size bolts. When shrunk-on rings are used the enlarged holes may be drilled out and cast-iron plugs driven in tightly.

A new type of housing arranged with through bolts, as shown above, is being used to replace the old badly worn tap bolt type of housing. This type of housing is also used on new split frame motors of more recent design. With this through-bolt construction, housings can be kept readily in good condition, as there are no tapped holes in the housing to wear, should they tend to work loose in service. If, on account of lack of maintenance, the threads of the through bolts become worn or damaged, they can be renewed at a small expense.

On motors of the split-frame type, using either the new tap bolt type, revamped tap bolt type, or the new through-bolt type of housing, to insure against housings working loose it is advisable to keep frame bolts and housing bolts drawn up tight. Lock washers should also be applied to all bolts and a good grade of heattreated steel bolts should be used. When assembling motors all dirt at the split should be removed and the armature bearings should be kept in good condition, all bolts should be inspected regularly and systematically, and they should be drawn up tight.

CHECKING ARMATURE AND AXLE BEARING WEAR

The proper maintenance of motor bearings involves careful inspection and gaging to determine when renewals should be made in order to keep the motors in good operating condition. This is most important in



Gaging the Radiul Wear of an Armature Bearing after Seven

connection with armature bearings, for when these are neglected and allowed to wear down too far, the armature will rub on the poles, which may cause the destruction of the armature winding and more or less damage to the fields.

In the case of motors mounted on cars equipped for single-end operation, running in one direction only, the bearing wear due to the torque of the motor and the action of the gear and pinion depends on the rotation of the armature, as is shown in Table I, which applies to either double or quadruple equipments of railway motors. With cars running in both directions, wear on both the armature and axle bearings is more uniformly divided between the top and bottom.

To determine when bearings are worn to the limit and should be replaced several tests may be made. First a light test can be applied to motor frames that have inspection holes so located that a light can be held at one end of the motor and clearance in the airgap observed by the workman. This method depends largely upon the judgment and experience of the man making the inspection and cannot be relied upon entirely.

Another method, very commonly used by many operators, requires a sweep gage made of varying thicknesses of cardboard or soft metal, and sometimes a long narrow flexible steel strip fitted with steel pads of varying thicknesses. These gages are inserted in the air-gap at the lower side of the motor. When the limiting minimum gage cannot be entered, the bearings show maximum allowable wear and should be renewed. In general, this method requires that the lower commutator cover be removed in order to apply the gage. This method may be applied to the upper side and a similar type of gage used, except that when the maximum gage can be entered in the air-gap at the top side of the motor the bearings show maximum allowable

TABLE I-DIRECTION OF BEARING WEAR

	-Inside	Hung Mot	ors	Outside	Hung Mo	lors
Position				Armature		
No.	Rotation	Armature	Axle	Rotation	Armature	Axle
1 and 3	Left	Down	Down		Up	Up
2 and 4	Right	Up	Up	Left	Down	Down

wear and should be renewed. When using this method the gages are inserted in the top commutator opening, the cover of which can readily be removed for this inspection.

On very small armatures the bearing wear can be approximately obtained at the commutator end by reaching in through the top commutator opening and lifting the armature and noting the play. This is a crude method and is only used to get a rough approximation of the wear. If play is noticeable, the lower commutator cover can be removed and a sweep gage used to check the air-gap. A more reliable test, similar to the above, is made by removing the lower half of the gear case, then prying up the armature at the pinion and measuring the lift from a fixed point on the motor frame or the gear. This scheme gives actual pinion and bearing wear and is satisfactory, but involves considerable labor and time.

The armature may be lifted by motor power. This method has been used successfully by a number of operators, but requires the use of a minimum size sweep gage, which is entered into the air-gap of the motor and, with the brakes set, power is applied by using the first notch of the control only. If the gage shows clearance under these conditions, the bearings are considered O.K. This test must be made with the reverser on the car thrown first in the forward and then in the reverse position in order to check all the motors on the car.

When the motor is off the car and the pinion is removed, the pinion and bearing wear can be measured with a feeler gage. This method is accurate but not practical, as it requires too much work to check the bearings under these conditions. This method can be used to check the commutator and bearing of a motor on the car by removing the commutator end dust cap. With experience, the condition of the pinion end bear-

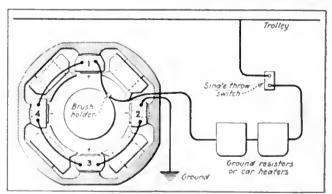


Fig. 3—Diagram of Connections for a Polarity Test of the Commutating Colls on Commutating-Pole Motor

ing can be estimated from the wear on the commutator end.

One operator reports considerable success in determining maximum allowable bearing wear by building up the front core band with solder and turning this down so that it extends in above the armature iron. When this band begins to show signs of rubbing on the poles it is an indication that the bearings should be renewed. Three or more pads of solder built up is in.

above the band and spaced equally around the armature would give a similar indication.

A device has been patented and used by one operator which is arranged so that when the bearings wear down to a predetermined point contact is made between the laminations of the armature and a small brass wheel supported by the frame. This wheel is caused to rotate and make contact with a bare fused jumper between the field coils, which grounds this field jumper, burning the fuse off and opening the motor circuit.*

Excessive wear of axle bearings is not as serious as that of armature bearings, as it only subjects the frame, axle cap and axle cap bolts to increased shocks and strains, and tends to spread the gear centers, with resulting less efficient gear operation, and rapid wear. For the above reasons, it is considered good practice to renew axle bearings that show a wear of from 1 to in. This is especially true with motors using 4 to 41 diametrical pitch gears. This wear can be checked with a feeler gage by the workman from the pit, if the motors are not fitted with axle shields. Where shields are used and are fitted with inspection holes, the bearing wear can be checked through these openings. If inspection holes are not provided in the axle shield, it is necessary to remove them to make the inspection.

Another method, similar to that explained for checking armature bearing wear, consists of setting the brakes and throwing the control to the first notch and noting the play of the bearing by the lift of the motor frame. To'check all motors on a car requires that this test be made for both forward and reverse positions of the reverser.

In connection with the life of armature bearings of railway motors, there are a number of things that must be considered when making a comparison of bearing life on various motors in service on different properties. It is a fact that the life of bearings of the same type of motor operating under apparently the same service conditions will vary widely, which no doubt is due to something inherent in the particular bearings in question, or to carelessness on the part of the men in charge of the upkeep and oiling of the bearings. With this in mind, it should be expected to find a wide variation in the life of the bearings on the different types of motors where they are subjected to all manner of service conditions, different methods of oiling, a large variety of lubricants, and with the upkeep and maintenance in the hands of many different types of work-

Most of the older type of motors used cast or malleable iron bearing shells with a heavy lining of babbitt anchored to the shell, while the more modern motors use bronze bearings which have a thin lining of babbitt which is made to stick to the shell by first tinning the inside of the shell. The following combinations are the ones found most common in service:

Shells	Lining Held by	Babbitt Metal
*Malleable iron		Lead base Tin base
Bronze	Shell tinned	Lead base Tin base
†Bronze	Shell tinned Shell tinned	No lining
Bronze		No lining

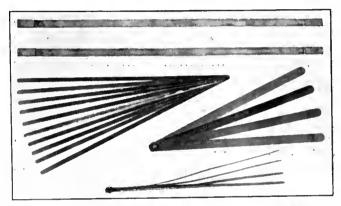
These bearings can be improved by tinning the shelis before

†This type of bearing is the one that seems to give best all-around results in service and is most commonly used.

It is extremely important that all the details of bab-

bitting bearings be carefully worked out and followed in order to get a finished bearing that will stand up satisfactorily under the severe service conditions. In this connection the bearing shells should be clamped carefully before babbitting and bronze shells should be well tinned. This operation will also improve bearings with malleable iron shells. It is desirable to use a good tin base metal for babbitting and the bearing shells and mandrels should be heated before pouring the bab-Babbitt should be poured at a temperature of bitt. from 460 to 480 deg. C. If all bearings are well tinned and then babbitted, the lining will stick to the shell and will be like a solid piece of metal. If such a bearing is held up by a piece of string and struck with a piece of metal, it will give out a clear bell-like tone.

Some operators babbitt bearings to the exact size of



Feeler Gages for Checking Air Gaps and Bearing Wear on Railway Motors

the journal plus an allowance and operate the bearings in this manner and apparently get satisfactory service under these conditions. The most common practice and the one that seems to give the best all-around results is to babbitt the bearing small and then to bore out the bearing to fit the journal. In some instances, the bearings are finished by means of a broaching tool which is forced through the bearing.

In general it is considered good practice to have all armature bearings fitted with oil grooves, so as to provide a better distribution of the oil to the surface of the journal. At least one of these grooves should extend to the bearing flange to supply oil at the rubbing surface between the bearing and the wiper ring. Bearings should have approximately from 3 to 5 tons press fit in the housing and in addition they should be held by either a key or a dowel as an emergency precaution. For this purpose, keys seem to be more satisfactory.

The most common type of bearings used are those fitted for oil and waste lubrication. The waste, preferably wool, is first soaked in a good grade of car oil for about twenty-four hours, and is then allowed to drain, after which it is packed firmly in the housing up to and around the bearing window. The housing is then filled up to within an inch of the top with waste packed in comparatively loose. It is considered good practice to repack these bearings every three months, putting new waste next to the journal. All waste should be removed about once every year.

In oiling bearings, a good grade of summer and winter car oil should be used. The most common practice is to use from one to two gills of oil at each oiling period, which is on the average every seven days. The use of too little oil is poor efficiency, as this apparent saving is more than offset by the added expense, due

^{*}This apparatus was described in detail in the Electric Railway Journal for May 17, 1919, page 971.

to either hot bearings or excessive bearing wear. The best results are obtained by pouring the oil into the separate oil well chamber, so it must feed up through the waste to the journal. If poured in on top of the waste it will tend to flood the inside of the motor.

Reports from a number of railway properties, both large and small, operating a great variety of different types of motors in city service show the following in connection with their armature bearing life:

CONDITIONS AND LIFE REPORTED

Material of bearing aheli
Material of bearing lining
Type of lubricationOil and waste
Oil grooves used
Oll grooves extended to the flange
Period of lubrication.

Seven days minimum, fifteen days maximum; majority of roads, seven days

*15,000 mlles minimum, 200,000 mlles maximum; \$0,000 mlles average
Method of holding bearings....Eleven use keys; five use dowels.

The allowable radial wear for armature bearings as reported above is from $\frac{1}{2}$ in. to $\frac{1}{6}$ in, with an average of $\frac{1}{6}$ in., while the end wear reported is from $\frac{1}{6}$ in to $\frac{1}{6}$ in., with an average of $\frac{1}{6}$ in. These figures are fairly representative and should be accepted as good practice to be followed. These figures are given for bearings which are used in connection with spur gears. There has been some question raised as to the end wear of armature bearings in connection with the use of helical gears. A recent investigation on several properties using both the spur and helical types of gears shows that the helical gearing does not produce any more armature bearing end wear than the spur gearing.

Boiler House Extension at Boston

POR some years the Boston Elevated Railway has been somewhat short of power, not so much in the turbo-generator portion of its station equipment as in boiler capacity. In 1916 the company installed at its South Boston station a 35,000-kw. turbo-generator to supplement the three 15,000-kw. turbines previously in operation at that station. The turbine was designed to use steam at 200 lb. pressure, the pressure then being carried in the boilers in the station, but it was so arranged that additional stages could be provided in an extension of the turbine casing so that a steam pressure of up to 600 lb. could later be used in this machine if necessary. Since the installation of this turbine the existing boilers have been run at higher rating.

This turbine has been rebuilt so that at 200 lb. pressure it has a capacity of 40,000 kw. This made necessary an addition to the steam generating plant, to utilize the full capacity of the station and supply the needs of the railway for power. It was decided to keep for the present the steam pressure at 200 lb., but the new boilers will be designed so that later they can be run at 275 lb. pressure, supplying steam directly to the 40,000-kw. turbine, until it should seem desirable to reconstruct all of the equipment for this higher steam pressure. Incidentally, the changes in the large turbo-generator have increased its efficiency 3 per cent.

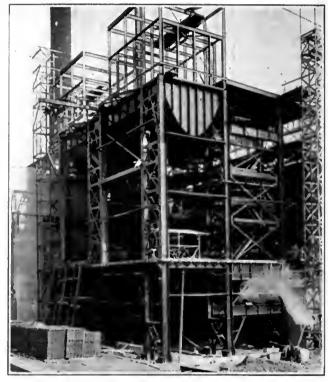
The new bollers, of which there are two, have a normal rating of 1,825 hp. each, with maximum rating of

6,400 hp. They are of the Babcock & Wilcox crossdrum type with thirty-nine sections in the header and twenty tubes high as compared with twenty-one sections in width and fourteen in height in the old boilers. A feature of the new boilers is their high setting, the distance from the boiler-room floor to the center of the mud drum being 15 ft. 41% in. They have a guaranteed efficiency as follows:

Rating	Efficiency				
100 per cent	81.5 per cent				
200 per cent	79.6 per cent				
350 per cent	73.5 per cent				

The boilers have Frederick underfeed stokers, supplied by the Combustion Engineering Company.

The boiler house of the station, including the coal bunkers and coal and ash conveyors, has been extended to accommodate these boilers, as shown in the engraving, the boiler house being designed so that duplicate boilers can be installed on the other side of the coal

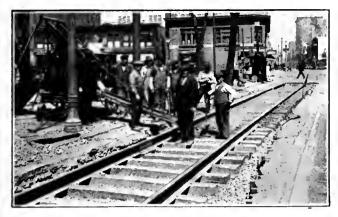


Side View of Boller House Under Erection

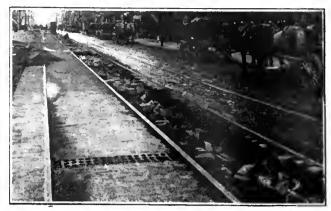
bunker in an extension of the boiler house to be built later. It was necessary, however, to build a new stack, and that is in course of erection. It will be of steel, 325 ft. high above the boiler-room floor and 355 ft. above the ground. The stack will be 15 ft. in diameter. Each boiler will be equipped with a Babcock & Wilcox superheater. Special foundations had to be provided for the station and stack on account of their height and comparatively small base area. The boiler plant was set on two concrete mats, each 36 ft. x 88 ft. and 6 ft. in depth. These mats rest on 400 Raymond concrete piles.

It is hoped that when this addition to the station is in operation, it will be possible to generate 1 kw.-hr. of alternating current at the switchboard for less than 1.6 lb. of coal, using coal containing 14,600 B.t.u.

The power station extension was designed by Dwight P. Robinson & Company, but the work of erection and the concrete work are being done by the Boston Elevated Railway with its own forces and by sub-contracting.



Track Reconstruction on South Clinton Street, Showing Pouring of Concrete Paving Foundation



North Street Improvement, Showing Track Drain, and New and Old Pavement

Features of 1922 Trackwork in Rochester

New York State Railways Makes Extended Use of Machinery in Track Construction and Reconstruction—The Past Year Was a Busy One in the Way Department

ONSIDERABLE construction work was done on the Rochester lines of the New York State Railways last year under the supervision of Horace A. Abell, engineer of way and structures. The principal work outside of extraordinary maintenance was as follows:

Reconstruction, South Clinton Street from Court to Monroe 625 ft. Extension of North Clinton line, Norton to Ridge Road... 4,800 ft. Reconstruction, North Street, Main to Central... 3,960 ft. Reconstruction, Main Street, Culver to Winton... 9,940 ft. Addition of double-track connecting curves, Franklin and North 250 ft. Replacement of light T-rail with 70-lib. T-rail on Charlotte line 4,500 ft. Temporary tracks for detour, Main and Caledonia... 700 ft.

While there was no one outstanding feature in this program, there were a number of detail features which are of interest. The following notes have been prepared, therefore, to answer such questions as would arise in the mind of a way engineer were he visiting this well-administered property.

The new tangent track in all instances was that as shown in the accompanying cross-section, consisting of 7-in. T-rail, wood ties and crushed stone ballast. A mechanical joint, consisting of an Abbott plate and standard bars with 1-in. high-elastic-limit drive-fit machine bolts, was used. This joint has proved very

satisfactory under the track and traffic conditions in Rochester. The bonding was done with Electric Railway Improvement Company brazed bonds $5\frac{1}{2}$ in. to 30 in. long.

This type of track construction has been standard in Rochester for more than ten years, but slight departure made this year was the omission of tie rods and the tilting of the rails inward at a slope of 1 to 20 by adzing the ties. So far this procedure seems justified, as the wear from the wheels takes place in the center of the ball of the rail.

A feature in the design of the pavement which is a departure from previous practice is the omission of grooved rail block along the gage side of the rail. The sandstone paving block and brick are laid under the head of the rail. This permits of better bonding of the paving bricks or sandstone blocks, and makes a neater job. This construction is also believed to be better for vehicular traffic. A new type of track drain was used this year also. This provides a catch basin underneath the track. Its surface appearance is shown in one of the illustrations.

The South Clinton Street work was a short job, done under traffic. The annual maintenance on this short piece of track had always been exceedingly high. The



Electric Shovel at Work on North Street Job



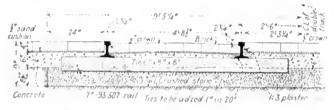
Dump Cars ln Work Train-Portable Forge at Left



Resistance Type of Equipment Used in Hall Bonding

wood block with which it was paved had never been satisfactory and the half-groove rail, laid in 1906, although not entirely worn out, caused many derailments when not exactly to gage. The new rail used on this job was L.S. section 93-507, and the pavement sandstone block.

The North Clinton Street job was a double-track extension from the old loop terminal at Norton Street to a new loop about half a mile directly northward, the old loop being left in place. Because of the lighter traffic anticipated over this line a 70-lb., 7-in. T-rail, L.S. section 70-267, was adopted, the joints being stand-



Standard Track Construction for High T-Rail with Brick Pavement

ard eight-hole bars with 1 in. drive-fit bolts. An Abbott plate was used under each joint. Brick pavement was laid in this track.

The North Street track had been in service since 1901 under fairly heavy traffic. The old rail was L.S. section 91-350, a 7-in, grooved rail. The old joints were of the electric-weld type, and wood ties and gravel ballast had been used. The new rail is L.S. section 93-507, with sandstone pavement. One track at a time was relaid, the car service on this track being rerouted to another street when necessary. A feature of the



Type of Concrete Mixer Which is I sed on All Construction in Mochester



Track and Pavement in North Clinton Street Extension

work was raising the entire track about 2 in, so that the city could place asphalt pavement outside the legal width without disturbing the old sandstone.

In connection with the North Street improvement, double-track connecting curves were built connecting North Street, southbound, with Franklin Street, westbound. This was to provide for the rerouting of the Hudson and Allen line, thus bringing it within a short distance of the business center. It was necessary to set the curb back at this location. Seven-inch, 140-lb. A.E.R.A. guard rail was used, with iron-bound and hard-center construction. The spirals were A.E.R.A. standard switch spirals. This company has adopted the 5.3 and 10.0 spirals as standard.

The largest reconstruction job this year was that on East Main Street. The old construction was open track on the side of the street, using 70-lb. A.S.C.E. T-rail. The new construction is standard paved construction in the center of the street. In this case the new track was constructed without disturbing the old one, thus taking care of the regular traffic and the work-train service. Brick pavement was laid on this job.

As the 70-lb. T-rail removed from Main Street was not badly worn, although it had been installed in 1907, it was used to replace a lighter-weight T-rail in open track on the Charlotte line, which rail had been in use since 1888.

The excavation on all the reconstruction work done this year was made with a ½-yd. Thew electric shovel. A Koehring ½-yd. electrically operated concrete mixer was used, and the tamping was done with an Ingersoll-Rand four-tool pneumatic tie tamper. Automatic dumping work cars made by the Differential Car Company were used in handling material.



Four-Tool Pneumatic Tic Tumper Used in East Main Street Construction

Reducing Lubrication Costs

Methods of Lubrication and Amount of Lubricant Used on Various Types of Motor and Journal Bearings on the Rolling Stock of the Northern Texas Traction Company and Tarrant County Traction Company, Fort Worth, Tex.

By H. M. Robinson

Mechanical Engineer Northern Texas Traction Company, Fort Worth, Tex.

N THIS description of methods used by the Northern Texas Traction Company for lubricating armature, axle and journal bearings specific information will be given regarding the amount of lubricant applied to different bearings, the interval between lubrication and the methods used for applying the lubricant.

The electric car oil used by the Northern Texas Traction Company is furnished by the Pierce Oil Corporation. It is a straight mineral oil, the summer grade being used about seven months of the year and the winter grade for the remaining five months.

The cost per thousand car-miles for the three divisions of the company is shown in the accompanying graphs, Fig. 2. This includes all lubricants for rolling stock, including trolley wheel and air compressor lubrication, over a period of twenty-six months. The record for the twelve months, September, 1920, to August, 1921, is typical of the experience before the installation of the present methods of lubrication. The graphs for the fourteen months from September, 1921, to October, 1922, show the results obtained in reduced costs by the present system and schedule of lubrication.

Fig. 1 shows the cost of rolling stock lubrication per thousand car-miles for all divisions and includes trolley wheel and air compressor lubrication for the twenty-six months, September, 1920, to October, 1922, inclusive. There is a decided reduction in the lubrication costs under the present schedule of lubrication, the city division averaging between 8 and 9 cents per thousand car-miles, the Fort Worth-Dallas Interurban averaging between 21 and 22 cents per thousand car-miles, and the Fort Worth-Cleburne Interurban averaging between 20 and 21 cents per thousand car-miles.

When it was decided to tackle the problem of reducing lubrication costs our first step was to advise the car oilers as to what we intended to do. A schedule of lubrication was laid out and the oilers were fully instructed as to the proper method of packing each type of bearing. Previous to this time, the oilers used their own discretion as to the amount of lubricant that should be applied to any bearing. The oilers were also given new Acock oil cans, manufactured by the Handlan-Buck Manufacturing Company, St. Louis, Mo.,

and new Alemite grease guns, manufactured by the Bassick Manufacturing Company, Chicago, Ill., and they were instructed to apply to the various bearings the amount of lubrication as called for in the schedule. If in the oilers' opinion the schedule required varying they were instructed to notify the foreman in charge, and the foreman acted according to the circumstances.

One big thing was to find out how much lubricant was needed for each type of bearing, so that it would

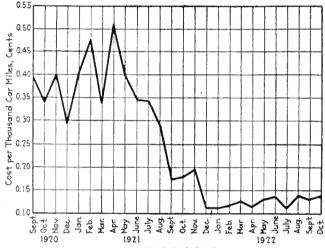


Fig. t—Cost of Rolling Stock Lubrication per Thousand Car-Miles for All Divisions

be well lubricated from one inspection to the next. This was determined upon by experimenting. In order to play safe, we allowed enough lubricant per bearing so that it could run about 200 car-miles more than it was supposed to run between inspections.

After the amount of lubricant was determined upon, it was necessary to supply the oilers with a device that would accurately measure the quantity and deliver the lubricant direct to the bearing. The Acock oiler, with a few modifications to suit our particular purpose, solved the problem.

The oil is delivered to the motor and axle bearings of all motors by means of a 1-gal. capacity Acock

	AMO	UNT OF OIL N	EEDED F	OR CARS ON R	EGULAR	INSPECTION		
FORT WO	ath Divis	SION (CITY CA	RS), NOR	THERN TEXAS	TRACTION	COMPANY, FT	. WORTH, TEX.	
Type Motors	No. of Motor Bearings	Amount of Oil for All Motor Bearings	No. of Axle Bearings	Amount of Oil for All Axle Bearings	No. of Journal Bearings	Amount of Oil for All Journal Bearings	Total Amount of Oil to Be Issued for Hose Can for This Type Csr	Total Amount Oil to Be Issue for Journal Ca for This Type Ca
GE 54, 81 GE 203	8	4 gills 3 gills	8	4 gills 3 gills	8 8 4	6 gills 6 gills 4 gills	2 pints 11 pints 1 pint	l pints l pints l pint
GE 54, 52, 81 GE 219	4	2 gills 3 gills	4	2 gills 3 gills	8	4 gills 6 gills	l pint l½ pints	I pint 1½ pints
GE 52, 54 GE 219 GE 203	8 4 4	3 gills	8 4 4	3 gills 3 gills	8 8	6 gills 6 gills	li pints li pints	ll pints ll pints ll pints
GE 201 GE 258 GE 258	4 4 4	3 gills grease grease	4 4 4	3 gills 2 gills 2 gills	8 4 4	6 gills gresse 2 gills	li pints	l½ pints ½ pint ½ pint l pint
	Type Motors GE 54, 81 GE 203 GE 81 GE 54, 52, 81 GE 219 GE 52, 54 GE 219 GE 201 GE 201 GE 258	FORT WORTH DIVIS No. of Motor Type Motors Bearings GE 54, 81 8 GE 203 4 GE 54, 52, 81 4 GE 52, 54 8 GE 219 4 GE 52, 54 8 GE 203 4 GE 204 4 GE 205 4 GE 205 4 GE 206 4 GE 207 4 GE 208 4 GE 208 4 GE 208 4 GE 208 4	FORT WORTH DIVISION (CITY CA No. of Motor Bearings	Tork Worth Division (City Cars), Nor. No. of Motor Bearings Motor Be	Type Motors	No. of Motor Bearings	No. of Motor Bearings No. of Motor Bearings Bearings Axle Bearings Axle Bearings Bearin	Type Motors





1.eft—Positive Oil Can with Hose Connection for Lublicating Armature and Axle Rearings. Right—Positive Oil Can with Connection for Oiling Journal Bearings

positive oil can, having a rubber hose 6 ft. long. At the delivery end of the hose is a check valve so built that the oil will flow through the check valve only when pressure is applied to the piston of the oiler, otherwise the oil would run out and be wasted. One push downward on the piston of this positive oil can delivers ‡ gill of oil to the bearing.

The same type of can is used for journal oiling but this has a k-in. pipe 12 in. long with three holes spaced respectively 1, 2 and 3 in. from the extreme end of the pipe, so that the oil will be delivered over the entire length of the journal.

Previous to the use of this system of lubrication, the oilers were allowed to take whatever quantity of

1.00 0.95 0.90 0.85 Ft. Worth City Division Interurban Division 0.80 Ft Worth-Dallas Interurban Tarrant County Traction Co. 0.75 Ft, Worth-Cleburne Interurban 0.70 0.65 per Thousand Car Miles, Cents 0.60 0 5 5 0.50 0.45 0.35 0.30 0 70 0 15 0 10 0.05

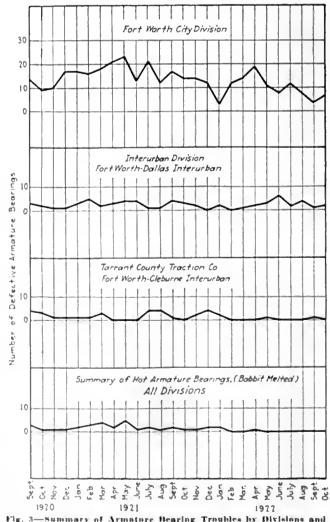
Fig. 2—Cent of Roiling Stock Intrication per Thousand Car-Miles by Divisions

lubricants they thought they would need for their day's work. As the oilers were not required to account for the lubricants used, the method was wasteful and loose.

All rolling stock on this property was also divided into groups, depending on the type of motors used. The quantity of car oil necessary to lubricate one car in each group was determined and this was further divided to indicate how much of the oil should be used out of the journal oiling can and how much should be used out of the motor and axle bearing oiling can or, as we commonly say, "the hose can."

This classification is as shown in the accompanying table. In the afternoon, when the master mechanic's office makes up the list of cars which will be inspected the next day, the clerk also makes up a lubrication requisition, calculated from the table. The next morning the oilers receive from the storeroom the exact amount of lubricants called for by the requisition. The oiler is expected to lubricate all cars on regular inspection with the lubricants given to him. If he does not do so he is called on by his foreman to explain. Of course, if the oiler requires extra lubricants for some extra work, other than the regular inspection cars, another requisition is issued to the oilers for the extra lubricants required.

The table shown is for the city division and similar tables are in use by the two interurban divisions, and the oilers are controlled in the same manner.



ig. 3—Summary of Armature Bearing Troubles by Divisions and Chart of Hot Armature Bearings for All Divisions







At Left, Pinion End Lubrication Connection for GE-258 Motor. In Center, Lubricating a Motor by Means of the Grease Gun. At Right, Commutator End Lubrication Connection for GE-258 Motor

The new system of lubrication has been in effect on the Fort Worth city division since September, 1921, on the Fort Worth-Dallas interurban since December, 1921, and on the Fort Worth-Cleburne interurban since October, 1921, and has shown a decided saving. The company now spends about \$1,000 a year for rolling stock lubricants instead of \$3,000 a year, as under the old system, thus effecting a direct saving of about \$2,000 per year.

Another saving has resulted from the decreased amount of work thrown on the mechanical department. due to hot bearings, armatures rubbing the pole faces,

etc., and it is significant that since the present system of lubricating has been in effect the number of bearing failures of all kinds has decreased materially. This is shown by the graphs in Fig. 3, which are typical. Better service has resulted from the elimination of hot boxes, and no one can estimate the value of this in dollars and cents.

The costs per thousand car-miles, as given in the graphs, are calculated from the costs of all lubricants used on the rolling stock, which includes electric car oil, air compressor oil, compressor grease, and gear lubricant. The costs per thousand car-miles does not

Oiling Schedule for Cars of the Northern Texas Traction Company

MOTORS-CITY CARS GE-52 and GE-54 Motors

ARMATURE AND AXLE BEARINGS

ARMATURE AND AXLE BEARINGS

Packing—Take a piece of wool felt 2 in.

square by § in. thick, and split it for 1½
in. Place the §-in. end in the slot in the shell
so that it touches the shaft and bend the
wings of the felt over the bottom of the shell.
Place a layer of wool waste about 1 in. thick
on top of the felt wings, then pack the remainder of the box with cottom waste, leaving room at the top for a piece of wool felt,
which should fit tightly in the top of the
box. Leave about ½ in. from the top of the
box to the top of the felt, as this space is
necessary for the oil.

Oil—Oil on a basis of 1,000-car-miles for
regular inspection, using ½ gill of car oil to
each armature and axle bearing.

GE-81 Motors

ARMATURE BEARINGS

Packing—Pack entirely with wool waste. Oil—Oil on a basis of 1,500 car-miles for regular inspection, using ½ gill of car oil to each armature bearing.

AXLE BEARINGS

Packing—Pack exactly the same as the bearings on GE-52 and GE-54 motors.

Oil—Oil on a basis of regular inspection every 1,500 car-miles, using ½ gill of car oil to each axle bearing.

GE-219 Motors

ARMATURE BEARINGS Friction, Side Feed

Packing—Pack entirely with wool waste. Oil—Oil on a basis of regular inspection every 1,500 car-miles, using \$\frac{3}{2}\$ gill of car oil to each armature bearing.

AXLE BEARINGS

Friction, Bottom Feed

Packing—Pack entirely with wool waste. Oil—Oil on a hasls of regular inspection every 1,500 car-miles, using \$ gill of car oil to each axle bearing.

GE-201 and GE-203 Motors

ARMATURE BEARINGS Friction, Side Feed

Packing—Pack entirely with wool waste. Oil—Oil on a basis of regular inspection

every 2,000 car-miles, using \P gill of car oll to each armature bearing.

AXLE BEARINGS Friction, Side Feed

Packing—Pack entirely with wool waste. Oil—Oil on a basis of regular Inspection every 2,000 car-miles, using § gill of car oil to each axle bearing.

GE-258 Motors

ARMATURE BEARINGS

Ball Bearing

Oil—At the beginning make sure that the bearings are full of compression grease. Then thereafter at each regular inspection (2,000 car-miles) give the grease gun four complete turns to each bearing, thus injecting 1 ounce of grease into the bearing. This 2 ounce of grease replaces the amount of grease that leaks out or is used up between inspections. of grease that lea tween inspections,

AXLE BEARINGS Friction, Side Feed

Packing—Pack entirely with wool waste. Oil—Oil on a basis of regular inspection every 2,000 car-mlles, using ½ gill of car oil to each axle bearing.

INTERURBAN MOTORS WH-56 Motors

ARMATURE BEARINGS

ARMATURE BEARINGS

Packing—Place a piece of wool felt \(\) in.
thick over the bearings. This is fitted into a slot in the shell so as to remain in place.
Place a layer of wool waste about 1 in.
thick over the bottom of the box, then pack the remainder of the box hard with cotton waste, leaving room at the top for a piece of wool felt which should fit tightly in the top of the box. Leave about \(\) in, from the top of the box to the top of the felt, as this space is necessary for oil.

Oil—Use \(\) gill of car oil once every twenty-four hours on each armature bearing.

AXLE BEARINGS

Packing—Same as armature bearings.
Oil—Use 1 gill of car oil once every twenty-hour hours on each axle bearing.

WH-76 Motors

ARMATURE AND AXLE BEARINGS Packing—Same as WH-56 armature and axle bearings.

Oil—Use ½ gill of car oil to each armature and axle bearing once every forty-eight hours.

GE-73 and GE-240 Motors

ARMATURE BEARINGS Friction, Side Feed

Packing—Pack entirely with wool waste. Oil—Oil on a basis of regular inspection every 1.500 car-miles, using 1 gill of car oil to each armature bearing.

AXLE BEARINGS Friction, Side Feed

Packing—Pack entirely with wool waste. Oil—Oil on a basis of regular inspection every 1,500 car-miles, using 1 gill of car oil to each axle bearing.

JOURNAL BEARINGS

City Cars

FRICTION BEARINGS

Friction journal bearings are oiled at each regular inspection of the car according to the needs of the box, but not more than ½ gill of car oil should be put on each side of the journal bearing at one oiling.

BALL BEARINGS

Grease at each inspection of the car every 2,000 car-miles. Force grease into the box until grease shows up at the plug hole at the top of the box.

On the average 2 ounces of grease at each inspection will replace the grease that leaks out or is used up.

Interurban Cars

FRICTION BEARINGS

Pack with wool waste. Oil at each regular inspection according to the oilers' discretion, but not more than \$\frac{3}{2}\$ gill of ear oil should be put on each side of the journal bearing at one oiling.

Gears on all types of city equipment are examined at each regular inspection and from 3 to 4 ounces of gear lubricant is applied.

Interurban Cars

Gears are greased at each regular Inspec-tion according to needs, but not more than 6 ounces of gear lubricant is applied at one time

include the cost of wool packing, felt, cotton packing, or the labor necessary to do the oiling.

The Fort Worth city division averages more than 500,000 car-miles per month, the Fort Worth-Dallas interurban averages more than 150,000 car-miles per month, and the Fort Worth-Cleburne interurban averages more than 40,000 car-miles per month.

The method used and schedule of oiling for the city and interurban cars on this property is given on page 121.

In repacking the city and interurban cars on this property, the packing is pulled out of all armature, axle, and journal bearings. It is then culled over and the best is used in repacking journal boxes. If there is not sufficient good old packing with which to repack the journals, the deficiency is made up by using new wool packing in the journals.

When repacking journal bearings, care is taken that none of the waste hangs out of the box, as waste in this position acts as a wick and will drain the oil out of the box. All motor and axle bearings, with exceptions as noted, were repacked with wool waste made by O'Neal Brothers, Inc., Philadelphia. Pa. The wool waste is soaked twenty-four hours and drained twenty-four hours, thereby leaving approximately 3 pints of oil to each pound of waste.

Cotton waste is soaked twenty-four hours and drained twenty-four hours. Felt is soaked twenty-four hours and drained until used, as felt will retain the oil even when left on the drain board for ten days.

In repacking armature and axle bearings with wool packing, the packer is careful to pack the waste moderately tight into the bearing, up against the revolving part of the axle. If the waste is not tightly packed it will settle away from the revolving part and cause a stoppage of the oil from the bearing.

Accompanying illustrations show the system adopted for greasing the ball bearings of our GE-258 motors. This is a modification of the Alemite lubricating system. Grease connections are added to each end of the motor as shown. These are raised high enough so that the grease gun can be applied easily through the trapdoors of the ear.

Nitrogen-Filled Transformer Case

A NEW principle in transformer design has been incorporated in a 25,000-kva. bank of power transformers under construction by the Westinghouse Electric & Manufacturing Company for the Middle West Power Company, Sargent & Lundy, consulting engineers. The new principle consists in filling the transformer case above the oil level with nitrogen. This is produced in an automatic generator attached directly to the transformer tank. The generator keeps the space above the oil level always full of the protective nitrogen.

The protective layer of inert gas above the oil level acts as a cushion or buffer to take the shock of any sudden pressures that develop under the oil level if there should be a short circuit or any defect in the transformer windings. The gas is easily compressed and it is enough of a buffer to take the brunt of the explosive pressure and save the tank from injury. The inert gas protects the oil against both air and moisture, and claims are made that oil used under the nitrogen will even improve with age.

The transformers for this Illinois installation will be the first of this type to be built.

The Readers' Forum

Progress and Prospects in Electric Railway Engineering

THE CLEVELAND RAILWAY COMPANY CLEVELAND, OHIO, Jan. 10, 1923.

To the Editors:

Referring to your review in the Jan. 6 issue it seems to me that during the past year no particular instance of greater advancement is found than that accompanying the development and adoption of automatically controlled substations and water-wheel plants. This type of equipment has reached a point of perfection where its reliability is no longer questioned, as is shown by the serious consideration being given to it by a number of the large properties where continuity of service is the prime necessity.

The coming year should witness a much greater development and corresponding increase in the number of installations, particularly because the issues involved in the adoption of such equipment are much better defined and more generally understood than heretofore.

There has also been evidenced, during the year, a tendency toward determination of standards regarding systems for use in electrification of steam railroads of various types. This is, indeed, significant, and it is hoped that progress will continue along these lines, removing the many differences of opinion existing, so that much greater activity may be registered in this particular field in the very near future.

Electric power at lesser cost is of vital importance to the industry as a means of meeting increasing competition. There are several methods which are now being utilized with more or less success for the production and distribution of small blocks of power. Reference is made to the possibility of utilizing numerous small automatic water-wheel plants, located upon unnavigable streams, all plants being arranged to feed into a common transmission system. Further development of the mercury arc rectifier or the vacuum tube may be possible also, rendering these devices applicable to conversion of energy on a larger scale and at a reduction in cost over present methods.

L. D. BALE,

Superintendent of Substations.

New York, Jan. 15, 1923.

To the Editors:

t have read with interest the engineering review appearing in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 6. There is just one point in connection with this review where I see a possibility of a misleading impression being given, namely, in the paragraph where the use of nickel-chrome steel in special trackwork is referred to.

It seems to me that the installations of this steel are so far entirely of an experimental character and represent an endeavor to prolong special trackwork life by means of repairs through welding. Not sufficient of this work has been in use long enough to determine its ultimate life and the maintenance cost in comparison with manganese steel and other constructions.

"ENGINEER."

Equipment Maintenance Notes

Dayton City Railway Remodels Cars for One-Man Operation

The Program for Reconstructing Double-Truck Cars for One-Man Operation Will Require an Expenditure of Approximately \$175,000— Some New Trucks and Motors Will Be Used

THE City Railway of Dayton, standing room on account of the Ohio, is remodeling all of its old narrow aisle. With the new ardouble-truck cars for one-man operation. There are fifty-six of these cars and they can be classified into four general types. In the first class are fifteen class 100 double-truck cars built by the Barney & Smith Company of Dayton, Ohio, in 1906. These cars have Barney & Smith class I maximum traction trucks and two GE-57 type motors. The cars weigh approximately 34,000 lb., and have cross seats, with an aisle 20 in. wide, which is too narrow for present service conditions. cars also have Cooper hot water heaters.

In the remodeling of these fifteen cars the trucks and motors are being retired, and in their place will be used fifteen equipments of 0-36 Standard Motor Truck Company's maximum traction trucks each equipped with two Westinghouse No. 306 motors.' These trucks and motors are at present in use under some steel cars which will also be remodeled, as referred to later.

In order to obtain an aisle of greater width the seating arrangement is being changed. Six cross seats are removed from the righthand side looking forward and six from the left-hand side in the rear. Longitudinal seats are installed in their place for the same distance as was occupied by the cross seats. This gives a staggered seating arrangement with cross seats opposite each longitudinal seat and so gives a much greater aisle width. As Gold electric heaters are to be used in place of the hot water heaters, the hot water heater and the the forward left-hand side, in place trucks. Trucks from fifteen of these eight, and a very small additional Cincinnati Car Company and con- same work as for the other steel

rangement the seating capacity will be the same, but there will be considerably more standing room.

A turnstile is installed on the rear platform, and as these cars are arranged for single-end operation with narrow platforms at the rear. additional seats cannot be installed The folding doors used on them are operated by National Pneumatic Company's standard equipment,



Car Remodeled for One-Man Operation in Service In Dayton

which is controlled by the operator from the front end of the car. Other equipment and appliances are the same as for the new cars recently placed in service, and described in the ELECTRIC RAILWAY JOURNAL for Oct. 28, 1922. The total weight of the cars as remodeled will be approximately the same as previously. The different type of truck decreases the weight somewhat, but the additional equipment installed just about makes up for this.

NEW TRUCKS AND MOTORS WILL BE USED

The second class of cars being front bulkhead are removed and two remodeled consists of twenty alladditional cross seats are added on steel cars which have Standard 0-36 of a short longitudinal seat which cars will be used under the class was necessary with the old arrange- 100 Barney & Smith Company's cars ment. The old seating arrangement just referred to. New trucks will referred to. The reconstruction of provided a seating capacity of forty- replace these, which are made by the these cars will require about the

sist of its standard arch-bar combination elliptic and coiled spring type of truck. Each truck has two GE-264 motors, which give a total of four motors per car. The cars have K-35-HH control and Westinghouse air brakes. The roofs of these cars consisted of steel over cork. This type of construction has not proved satisfactory, as the roof has deteriorated after being in service only ten years. New wooden roofs will be placed on these cars. other five cars of this class will retain their present trucks and equipment but will be completely overhauled and will have new roofs. new brake rigging on the trucks and will have the additional equipment such as heaters, mirrors, buzzers, fare boxes and the like installed, as required for one-man operation.

The turnstiles used on these cars are mounted just inside the body in a position quite similar to that on the new cars previously referred to. Originally these cars had a rear drop platform. This is rebuilt so as to bring the platform floor flush with the car floor. A small well is retained with an exit step and passenger seats are provided around the end.

The former seating capacity of these cars was forty-four. eliminating a short longitudinal seat where the turnstile is installed and by adding seats on the rear platform a seating capacity of fortysix is obtained. The former weight was 32,000 lb. By substituting the arch-bar truck with four 25-hp. motors of the Standard 0-36 trucks and Westinghouse No. 306 motors, and by replacing the hot air heater with electric heaters, a saving in weight of 4,000 lb. is obtained, so that the remodeled cars will weigh but 28,000 lb.

The third class of cars being remodeled consists of ten steel cars, which are of a slightly different type than the second class. They are equipped with Standard 0-45 maximum traction trucks and Westinghouse No. 306 motors. length of these cars is also different from the steel cars previously

cars except that the original steel shaped gap with a gas flame as the roof will be retained, as it is at present in fair condition and does not warrant replacing. All the equipment will be carefully overhauled and the rear platform will be built out and seats provided in a manner similar to that for the other steel

The fourth class being reconstructed is eleven double-truck cars with wooden bodies. These are equipped with Standard 0-45 trucks and Westinghouse No. 306 motors. They are being rebuilt by the Oakwood Street Railway of Dayton in its shops for one-man operation with similar arrangement and equipment as described for the steel cars just mentioned. The old seating arrangement provided a capacity for forty-eight passengers. With the improvements this will be increased to fifty-two. Seven of these cars have already been completed and are now in service.

All material for this remodeling and reconstruction has been ordered and amounts to approximately \$175.-000. The work is progressing rapidly and it is thought that by March. 1923, the road will have 100 per cent one-man operation with as fine and up-to-date equipment as any similar road in the country.

Broken Compressor Shafts Welded Cheaply

BROKEN compressor armature shafts are not replaced but welded in the Elyria shops of the Cleveland, Southwestern & Columbus Railway. The breaks usually occur where the shafts have been turned to a smaller diameter to receive the



Broken Compressor Shuft Repaired by Weldling

pinlon. The end of the broken shaft is turned to a point as is the practice with new stock, which is 1 in, larger in diameter than the shaft. The armature is centered on the tail stock of a lathe with a rest under the shaft near the point to be welded and the new piece is centered and held in the chuck. The welding material is then melted into the V-

armature is slowly rotated.

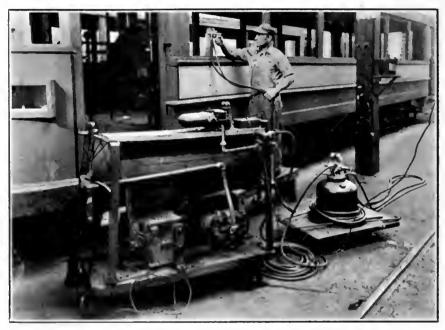
The cost of making such a weld alone is about \$1 and it is estimated that the machining costs slightly more than \$1. After the job is

finished it is impossible to detect any sign of the weld. This same method is used whenever possible in repairing main motor shafts since the removal of the shaft would necessitate the stripping of the armature.

Home-Made Portable Compressor Outfit for Paint Spraying

1 shows a portable compressor

THE accompanying illustration hook on a long pole so that this can be hooked over the trolley wire as outfit constructed in the shops of desired. The ground connection is the Grand Rapids (Mich.) Railway. made by a flexible lead to a clamp It consists of a three-wheeled truck which is attached to the track. All on which are mounted a compressor, of the equipment used was obtained



Shop-Constructed Portable Compressor Outfit for Paint Spraying

air reservoir, governor and necessary switches, fuses and strainer.

The compressor is mounted directly on the wooden platform at the bottom and the air compressor reservoir is installed directly over this and supported by a strap-iron framework. A board on top of this framework serves for holding the governor and switch which is connected in the compressor circuit. As dry air is quite necessary for paint spraying, particular precautions have been taken in this respect, and a strainer is installed between the compressor tank and the connection to the paint-spraying equipment. The piping is also provided with a drain with a pipe connection at the bottom to form a pocket for receiving any water. The reservoir also has a drain cock at the bottom.

made by having a lend from the It is his duty to see that the floor

from a dismantled car. The arrangement is very compact and can be readily hauled about the shop by one man and can thus be placed in any location convenient for spray painting.

Good Scheme for Keeping Shop Neat

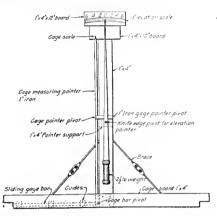
THE Fall River division of the Eastern Massachusetts Street Railway has considerably rearranged the maintenance shops at Fall River. Here light repairs are made, oiling is done, etc. In the pit shop where the inspection and light overhaul work is done a successful and economical plan of keeping the place looking neat is used.

The shop is divided into areas, and The electrical connections are each man is assigned to one of these. compressor switch attached to a and equipment within his area are in first-class shape when work starts in the morning. The areas are not so large but that the cleaning up can easily be done during the fifteen-minute period allowed for this purpose in the morning. The work is done in the morning rather than at night because experience has shown that it is done better when the men are fresh rather than when they are tired at the end of the day's work and are anxious to get home to supper.

In order that there may be no difference of opinion as to the territory assigned to each man, a chart is posted showing the boundaries of each area and the name of the man assigned to take care of it.

Device for Gaging Track and Determining Elevation

HIGH-SPEED interurban roads require frequent inspections of curves to make certain that the track gage and elevation are within the limits desired. With the usual form of track gage and a common level, considerable stooping is necessary by the man doing the work, and various devices have been produced



Combination Track Level and Gage Board

to make this inspection easier and less trying. Among the home-made devices used is one by C. S. Lusk, section foreman of the Erie Railroad, which was described in a recent issue of Railway Maintenance Engineer.

The device includes both a track gage and a level, and except for a few strips of iron and the bolts that are necessary for fastening the parts together, the machine is made of 1-in. x 4-in. boards, and weighs but 12 lb. An accompanying illustration shows the construction of this device, which consists of a wooden cross-piece or gage board with a

. vertical standard or upright fastened to this. Two pointers are mounted on the upright, one for measuring the elevation and the other for measuring the plus gage of the track. The gage board is notched at the end to fit the rail head and has a sheet-iron band to protect it from wear. On the back side of the gage board is a bar of iron which works in guides and has a movement along the gage board. The inside end of this bar is connected by a pivot to the vertical pointer. This pointer is pivoted at the center and by pulling the top end until the bar on the gage board engages the rail head a reading can be obtained of the number of inches as marked on the scale board.

The pointer for measuring elevation is approximately 4 ft. long and is kept plumb by a 2½-lb. weight attached to the lower end. In order to provide a pivot which will work without appreciable friction, the pivoting bolt is filed to a V shape and the hole in the pointer is bushed with a thin iron bushing. An elevation scale at the top enables the operator to read the elevation conveniently as soon as the pointer comes to rest. The scale is divided so as to show the elevation in inches.

Jones Gets Some Pertinent Pointers on Housekeeping

HE face of the machine shop foreman on the Jinxville Electric Railway property wore a frown that morning as he sauntered sullenly in front of the lathes where his men were turning up bearing shells for Westinghouse 69 and GE 73 motors. "S'matter, Bill, you're darn glum this mornin'. Anybody sick at home?" spoke out "Whistling Dick" Singer, one of the old timers who was a warm personal friend of Bill Jones, the foreman.

"Nothin' wrong at home, I'm glad to say, Dick, thanks. Fact is the boss just had me on the carpet about the looks of this here shop. He says it's a disgrace the mussy way the machines look. And the floor, he says, looks as if it hadn't been swept in a month. The old place looks good enough to me. You don't expect a railway machine shop to look like a front parlor on a Sunday mornin'."

"No, Bill, you don't, but I've wished for a long time you'd have the shop kept neater. I hated to mention it, for fear you'd think I was buttin' in. Fact is, Bill, you ought to change the way machines are used around this shep. Now, bein's the boys kind o' look up to me they've let me hang onto this 12-in. lathe right along. It's the only one in the place that's true. I can get good work out of it. I try to keep it clean and I keep that nld box underneath to catch most of the turnings off those bearings. Most of the fellows, however, work on any one of the machines they need and they use it for a time, then shift to another one. They don't give a



rap whether they leave it lookin' neat or not. Say, you did a good thing when you put Ole Olson on that radial drill three months ago. That shows what having your own machine will do for a fellow. That guy loves that machine like a baby. He cleans it up every night; and did you notice he puts boards on the bedplate under the motor shells, so the bedplate won't get scored? Some careful lad, I'll say; but I believe it pays."

"Wait a minute, Bill," continued Dick.

"Wait a minute, Bill," continued Dick, as Bill made as if to move on a little impatiently. "While I'm suggestin', if I was you I'd give each careful man a machine of his own as far as you can and make him responsible for it. Give him a word of compliment now and then if he keeps it neat. He'll take real pride in it, and the machine will last years longer. And say, Bill, jack that dago sweeper up so he'll take a little more care of the floor. I believe we'd all get more fun out of our

work and do it better, too, Bill, if the place looked trimmer. Think it over. No offense, I hope, Bill?"

"Sure not, Dick, old top; you said something. Open your head whenever you feel like it, Dick. I've got to do something to please the boss, anyhow. Maybe you've got the right done."

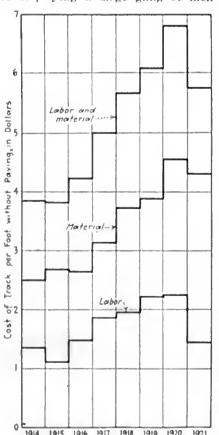
got the right dope."
"By the way, Bill, the road's making a little money now. Wonder if you could get the boss to huy some new machines and get rid of these antiques. They take about three times as long to do a job as they ought to and it isn't right when you tet don."

get done."
"I don't know, Dick. I might try the old man again, after we get the shop cleaned up so he'll be a little sweeter. Maybe he could get the G. M. to O. K. a purchase order now. Heaven knows we need some new machines. That's why I ain't had no heart to doll up these eld relics."

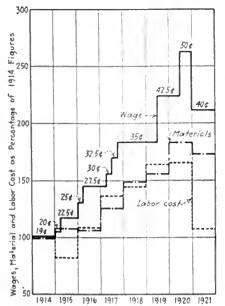
Labor-Saving Machinery **Shows Economies**

THE results of the use of laborsaving machinery, devices and methods in track construction by the Cleveland Railway are shown in the accompanying charts. One graph is based on the actual cost per foot of track construction, and the other shows the percentage change in the wage scale and material and labor costs by years since 1914. The latter curve indicates that the employment of labor-saving methods and machinery helped materially to hold the labor costs within reason in spite of a rapidly mounting wage scale. The curve also indicates that the labor costs as an average over the entire period were held down to about the same increases as took place with materials. While little could be done to reduce materials expense, it is seen that the utilization of new devices as they were developed was effective in smoothing the wage scale peaks from the labor cost.

Present-day Cleveland track reconstruction tactics include the use of plows for tearing up paving. This method has eliminated the necessity of employing a large gang of men



The Labor Rem in Track Construction Has Reen Reduced by Use of Modern Equipment



Actual Labor and Material Costs for Track Construction in Cleveland

and as a result has reduced that item of cost from a considerable to a negligible proportion of the total. Cutting out old rail with gas torches has likewise been a great aid in saving labor and time. The further economies are largely the benefit derived from the use of larger and better equipped work trains, steam shovels, concrete mixers, gravel conveyors, etc.

Nicks in Trollev Wire

MANY linemen have a custom of nicking the trolley wire when they wish to renew a frog, crossing or other casting supported from it. This is usually done with their pliers so as to mark the exact location of the old casting and to permit installing the new one in the same place.

This is bad practice and should not be permitted. Copper wire is weakened greatly by a very small nick or even a scratch and is much more liable to break where it has been nicked than at any other place. Copper wire manufacturers have experienced difficulty from this and when copper wire is tested at the mill the manufacturer insists that the inspector take samples for testing from a point several feet from the end of the reel, preferring to scrap a number of pounds of wire rather than to take the chance of getting a poor sample that has been damaged by scratches when being coiled on the reel.

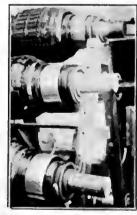
to any copper wire, even if soft- also was found unsatisfactory.

drawn or alloyed, it is most harmful to hard-drawn wire, which is the kind used for trolley wire on all roads except those using some of the special alloyed wire. The "skin" of a hard-drawn wire is much harder and stronger than a like area of the same wire inside of this outer coating, and once the hardened portion has been cut through, the wire beneath is but little stronger than soft-drawn wire.

The fact that the nick comes just where the casting is attached to the wire results in the wire being weakest just where it is exposed to the greatest stresses. Most of the vibration of the wire must be absorbed at the castings because of the change from the more or less flexible trolley wire to the rigid casting. The results of the practice of nicking the wire are therefore to reduce greatly the life of the wire and to increase liability of breakage.

Solid End Armature **Bearings**

THE accompanying illustration shows a type of solid end armature bearing which has been used by the Spokane United Railways for several years and has proved very satisfactory. Trouble was experienced with the usual type of openend bearings due to the impossibility of keeping sand, grit and like substances out of the bearing and to the difficulty of keeping the oil in. The new type of bearing now used is cast



Solid End Armsture Rearings. At Top-Old In Center and at Bottom-New Solld End Type

with a solid end and results show that these require to be re-oiled only about once every 900 miles, whereas the old type required attention about every four days with less than half the mileage. A type of bearing with While this nicking is detrimental a screwed-in end was tried, but this

New Type Passimeters in New York

Automatic Passimeters with Coin Box Have Been Tried Out in the Subway Stations of the New York Municipal Railways, and Their Use Is Being Extended

A and registering passimeter has been installed in several of the stations of the New York Municipal Railway and is proving very efficient for speeding up fare collection and for preventing congestion. The mechanism consists essentially of two units-the coin box and the passimeter. These are installed in the line of entrance of passengers with the coin box in front and the passimeter just beyond, so that passengers on entering deposit their nickels in the slot of the coin box and when recorded the passimeter is unlocked so that entrance is obtained without obstruction. These automatic turnstiles are installed in banks, the number of individual mechanisms depending upon the service requirements at the particular point. Another innovation has been made in the arrangement for collecting fares. Instead of requiring all passengers to obtain change from a change booth and then pass through the automatic turnstiles the change booth is located in such a position that passengers who have not the necessary 5-cent piece for operating the automatic mechanism can pay their fare and then pass through a registering turnstile without the necessity of returning to the other machines.

The turnstiles are designed for use solely as entrance facilities and separate exits are provided at each of the points where the turnstiles are installed. This arrangement serves to divide the incoming and outgoing traffic at each point and eliminates congestion due to the use of the same facility for both entrance and exit purposes at important traffic centers.

The coin box consists of a rectangular sheet-iron housing 37 in. x 12 in. x 12 in. One-eighth-inch sheet iron is used in its construction, and the corners are reinforced with angle irons. The upper portion of the coin box is used for the mechanism necessary for receiving the coins, recording them, and establishing the necessary connections for unlocking the passimeter. The lower part is used for the lock-up receptacle which receives the nickels after they are released by the upper mechanism.

The lock-up receptacle is a new and original design with special features for safeguarding the money re-

NEW TYPE of fare collecting ceived. These receptacles are 12 in. and registering passimeter has x 12 in. x 12 in., and are provided with a locking mechanism at the top. The receptacles are placed in the lowy and is proving very effiored.





At Left-Coin Box. At Right-Passimeter,

box with the top opening unlocked and open. The bottom portion is then closed and locked. To remove the receptacle the entrance door is unlocked and the receptacle can then be pulled out. In doing this, however, the receptacle is automatically locked and cannot be opened by any one before it reaches the receiver in the main office, who is the only person with a key for unlocking the receptacles.

The mechanism in the coin box for receiving and registering the fares and unlocking the turnstile is the same as that used in a type of coin box used by the Brooklyn Rapid Transit Company and described in the ELECTRIC RAILWAY JOURNAL for Sept. 9, 1922, except that this mechanism can be operated only by

a nickel. The slot for receiving coins, however, will receive both pennies and dimes, but these coins pass through without interruption into a coin receptacle and are thus returned to the passenger without unlocking the turnstile. Provision is also made for returning nickels which may be in such a battered condition that they will not operate the mechanism, or coins which may be deposited while the mechanism is temporarily out of order. A push button is provided in the top portion of the box, and by pushing this the coin is automatically returned to the coin receptacle. The slot in the top of the coin box for receiving fares is of sufficient depth so that two nickels can be deposited at one time and these will permit the entrance of two persons before it is necessary to deposit another fare.

The passimeter consists of a top unit which has four wooden arms. This is mounted on a cast-iron base. The top head carrying the arms is constructed in a unit so that it can be quickly detached and removed for repairs if necessary, and another head reinstalled in its place without delay. The center portion carrying the arms has ball bearings, so that very little pressure is required to rotate the arms. A spring is also provided which assists in the movement of the arms after they have once been started and insures that they rotate 90 deg. to their required stationary position.

The mechanism for unlocking the passimeter and controlling its operation is installed inside the lower cast-iron base. This mechanism is also mounted as a unit, and should it



PassImeter with Automatic Coin Boxes Installed in the Thirty-fourth Street and Broadway Station of the New York Municipal Railway

get out of order it can be quickly removed and a new mechanism put in place so that repairs can be made at the shops. The height from the base to the top of the arms is 36 in., and when installed in position a sheet-iron cover is provided across the top and this extends down on the outside so as to provide a smooth surface and thus prevent the catching of clothing, hand bags, and the like, of passengers as they pass through the turnstile. The top unit of the passimeter is arranged to swivel a slight amount in either direction. Rubber bumpers are provided so that should the arms be pushed forcibly, as is frequently the case when passengers are in a hurry, the vibration and strain is taken by these rubber

Accompanying illustrations show an individual unit and also a battery of five passimeters as installed in the New York Municipal Station at Thirty-fourth Street and Broadway, New York. The equipment was developed by E. J. Kennedy, superintendent of the railway register department, and the equipment is being manufactured by the Perey Machine Works, Brooklyn, N. Y.

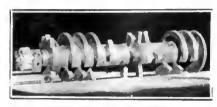
Truck Mounting for Compressor

THE mounting of compressors and the installation of air brake equipment on single-truck cars which are to be used for one-man operation often presents quite a problem. It is desirable to keep the overhang at the ends for such cars as short as possible, and there is very little room for the installation of equipment in the center portion of the car. The accompanying illustration shows a method of mounting the compressor on some single-truck cars being con-

verted by the United Traction Company of Albany, N. Y. The compressor is supported by two channel irons which are fastened at each end of the truck sideframe by U clamps. These channels drop down after extending inward about 10 in., so as to provide the desired clearance for the top of the compressor when installed.

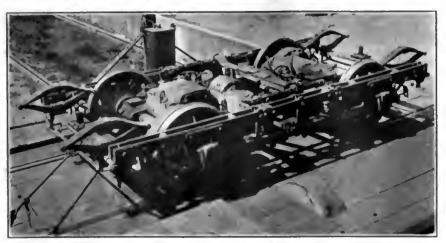
Kinks in Repairing Controller Drums

Many of the older types of controller drums were made from a solid piece of brass so that there was no way of renewing the segments burned down by arcing. A number of G. E. C-6 drums of this construction that had been removed from



Curved Strlps Form New Contact Surface on Segments of Old-Type Controller Drum

equipment on the Lake Shore Electric Railway, Sandusky, Ohio, because of burned and worn-down segments were again made serviceable by turning all the segments to the same radius in a lathe. They were restored to the proper radius by having curved brass strips, 4 in. in thickness, screwed on. The screw heads were not countersunk but were cut off and the contact surface smoothed up. In some cases more than 1 in. had been burned from the corners of the segments, but no attempt was made to turn off any more than the standard amount. gaps between the segments and the new strip were filled in with solder.



Compressor Mounted in the Center of a Single Truck

Platform Lights for One-Man Cars

METHOD of providing lights on A the platforms of cars operated by one man whenever the doors are open and the steps lowered has been in use on the cars of the Springfield (Mo.) Traction Company for some The plan, it is found, retime. duces boarding and alighting accidents, and the operator is also provided with the necessary light for making change, issuing transfers, The device also serves as an additional safety device so that the operator can tell the instant the doors are properly closed and steps folded, and thus operation can be speeded up.

The additional lighting circuit and provisions for making connections are shown in the accompanying illustration. An additional circuit of five lights is installed, two on one end and three on the opposite end of the

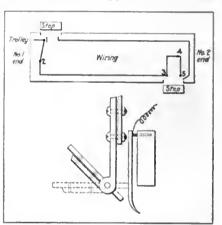


Diagram of Lighting Circuit for Platforms of One-Man Cars—Step Confact Mechanism for Grounding Lighting Circuit

car. These lights are wired in series by tapping on to the positive side of the lighting circuit and by grounding the circuit through contacts operated by the folding steps. In the accompanying diagram the circuit passes through lights 1 and 2 at the No. 1 end of the car and then through lights 3, 4 and 5 at No. 2 end of car. The ground side of the circuit is connected to two contacts, one at each step, so that whenever either step is lowered the ground connection is established.

The grounding contact consists of a spring mounted on a block of wood. As the step is lowered, a small metal portion on the back makes the contact with this spring and establishes the ground connection. Most step mechanisms have a projection which can be used for this connection.

Spring Trolley Ears in Cleveland

IN REPLACING the trolley on a 1,500-ft. section on both tracks of the St. Clair Avenue line, the Cleveland Railway has used No. 0000 grooved wire supported with Drew spring ears. It is intended to extend this type of construction along St. Clair Avenue, which is one of the heavy traffic lines of the city. James Scott, engineer of overhead construction, feels that this type of suspension is the proper one to use for stringing grooved wire and that its merits will soon be found under actual heavy service conditions.

The Drew ear is slotted only deep enough to receive the upper section of the grooved wire so that the trolley wheel does not come in contact with the ear itself. With no irregularity in the lower surface of



Spring Ear Used on St. Clair Avenue Line, Cleveland

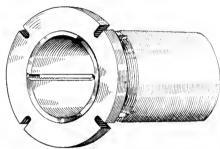
the wire, arcing is practically eliminated when the wire is drawn tight, as is the practice in Cleveland. The spring steel support is also effective as it reduces what might be called the unsprung weight of the overhead. This type of ear was used in the overhead construction on the high level of the Superior Street tunnel and has been in use for about a year.

Self-Centering Chuck for Finishing Motor Bearings

A HOME-MADE chuck to hold motor bearings while they are being bored has proved a time saver in the shops of the Cleveland, Southwestern & Columbus Railway at Elyria, Ohio. The features of this chuck are shown in an accompanying illustration. The bearings are automatically centered, the outside portion having previously been machined. The chuck is screwed onto

the headstock of the lathe like any other chuck and its bore is of such a diameter that the bearings form a sliding fit.

After a bearing has been inserted in the chuck it is held and centered



Home-Made Self-Centering Chuck for Holding Motor Bearings

by merely screwing up the threaded outside ring with a spanner. The inside shell of the chuck is split in three places so all three jaws close in on the work together.

The old chuck replaced had two jaws instead of three and each side was brought together independently with bolts passing through lugs. It required considerable adjusting and several trials before the work could be centered. Elimination of this task permits finishing bearings in one-third the time formerly used.

The simple construction and cheapness of such a chuck will enable any master machanic to make one for himself. It is made from a hollow brass casting solid on one end. The end is bored and tapped to fit the headstock threads and is then attached as it normally would be used while the inside is bored to the correct diameter and the outside is machined and threaded. The slots are cut on a milling machine.

Trough and Drainboard for Cleaning Screens

RAILWAYS which use car screens as guards to prevent passengers putting arms and heads out of open windows find considerable difficulty in cleaning the screens. The ordinary brush method has proved quite unsatisfactory, and for thorough cleaning it is necessary to remove the screens from the car. The accompanying illustration shows a portable tank and drainboard used by the Grand Rapids (Mich.) Railway for the cleaning of its car screens.

A compartment at the lower front edge is made watertight and is filled with some cleaning fluid which will loosen the dirt readily. The width of this trough is sufficient so that four screens can be put in at once. This constitutes the equipment for one car.

The screens are allowed to soak in this compartment to loosen the dirt and then they are removed one at a time and placed on the drainboard which constitutes the back of this trough and is inclined toward the front edge. After a few minutes' draining they are placed in a washing tank, which is shown at the back in the accompanying illustration, where the screens are thoroughly rinsed.

The device is constructed in a very substantial manner and is mounted on four rollers so that it can be pushed to the side of the car from which the screens are being removed for cleaning. The equipment has been found very convenient and a time saver for this class of work.



Portable Trough and Drainboard Which Have Been Found Effective in Grand Rapids for Cleaning Car Screens

Reconstructing Cars in Berlin

By the Use of a Special Truck Framing the Entire Car Body, Together with Long Platforms, Is Supported by the Truck Construction

BY E. KINDLER

Chief Engineer The Berliner Strassenbahn

THE decaying of the wooden of four flat leaf springs resting structure of electric cars operated by the Berlin Railways has caused considerable trouble and has necessitated a thorough overhauling of the car body every two or three years. The joints between wooden and steel girders become loose and allow water to enter, which causes rusting of the steel and rotting of the wood to such an extent that the entire car body becomes rickety. In an attempt to remedy this condition, the single-truck cars which are now being rebuilt have a truck frame extending the full length of the car body which supports the entire superstructure. For supporting the platform four 43-in, channels are attached to the truck framing. This construction gives a lighter weight car as well as a stronger one. The platform girders can be readily replaced, which is of great importance as collisions are quite frequent in Berlin. To protect the windows, roofing and vestibule sheathing, a steel reinforced wood bumper is provided at either end of the car. This takes the place of a heavy all-steel buffer previously used.

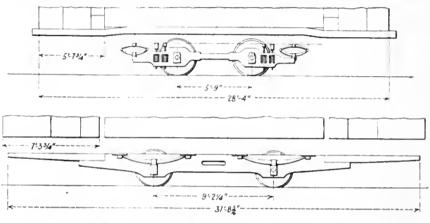
The flat, through-going supporting surface provided in the truck construction has a further advantage on this system, which uses many different types of cars, as car bodies of varying length can be placed upon the same truck. In reconstructing the cars a judicious shaping of the vestibule produces cars of uniform length and the passenger capacity can also be standardized.

The spring construction consists

directly on the journal boxes. Each of these is 68 in, long and 4 in, wide, and is built up of eight leaves. In order to give flexibility the ends slide in slots. The wheelbase of the reconstructed cars has been increased considerably, the dimensions being 9 ft. 2½ in. now as compared with 5 ft. 9 in. previously. The frame is constructed of in steel plates riveted

COMPARISON OF OLD AND NEW CARS Old Weight of car, 9.1 tons Seating capacity tandln capacity 1 20 20 capacity lear body...
t a n d l n
capacity learning 2 14 94 Total passen-ger capacity. Over-all length Wheelbase Length of ves-tioule 5 ft. 77 in. 7ft.3% in. Wheel pressure (full), lb...7,000 Weight of car 6.900 per passen-ger, lb. 550 400

motormen by opening this window. Outer doors are 28 in, wide and are of the Dresden type, which consist of



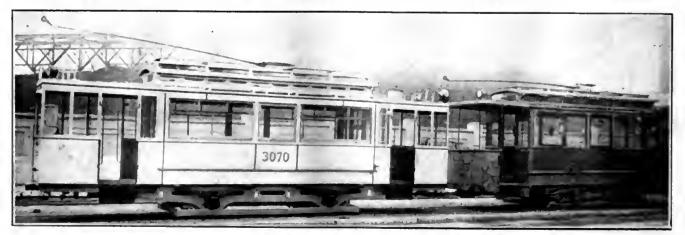
Comparison of Truck Construction of Old and New Cars

together, the openings having their edges reinforced by angle irons. Gusset plates are used at all corners.

In the remodeling, the car bodies inside the bulkheads are not changed materially. In order to do away with the use of large sizes of glass, the side windows are divided into a number of panels. Glass & in, thick is used. The platforms are lengthened from 5 ft. 7% in. to 7 ft. 3% in.

The vestibule ends are provided with the usual sliding windows to permit throwing of switches by the a folding upper part with an inserted board at the bottom. This board insert has to be changed from one door to the other at the end of the line, but has advantages in space and in easy adaptation to weather conditions. A new German patent type of coupling is used. This has a special spring arrangement which insures smooth operation when two cars are coupled together.

Hand brakes are of the lazytongue type, which insure that the brakeshoes will fit to the wheels re-



New Constructed Car at the Left, Old Car at the Hight

gardless of the load on the car. This type also prevents any grinding of the shoes upon the wheels and consequent uneven wear. The shaft of the hand-brake spindle carries a spiral groove casting to take up the chain.

Some changes were made in the electrical equipment, which was of obsolete type. The motors, which are GE-52, have been retained. Through this construction the rolling stock has been improved to a considerable extent, and expensive investments in new equipment and enlargement of shops have not been necessary. An accompanying table gives a comparison of the old and new cars.

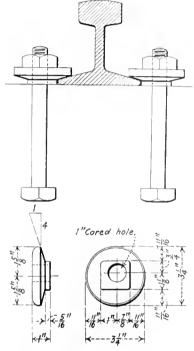
Inside Rigging Eliminates Brake Troubles

DURING the past few years the Lake Shore Electric Railway, Sandusky, Ohio, has changed over the brake rigging on about forty trucks from outside to inside hung. A number of faults and undesirable features in the old construction were overcome by the conversion. outside-hung brakes caused a lot of chattering and were difficult to maintain in adjustment. There was also trouble from the breaking of the beam pull rods, and the absence of transoms in the truck construction allowed an excessive stress on the bolsters with the result that they were pulled out of shape. As one consequence of this, abnormal wear of the wearing plates and center bearing resulted.

These difficulties were all remedied by having steel transoms cast from which to suspend the inside brake rigging. The addition of these permitted the circle bars to be moved closer to the bolster centers so the turning of the truck has a decreased effect on the brake adjustment and minimizes the danger of tearing the rigging to pieces when the car splits a switch.

Eccentric Grip Washer

OCCASIONS sometimes occur when it is desirable to provide permanent fastenings for different widths of equipment. An example of this is the use of different rail sections on a concrete structure where the bolts used for fastening are set in the concrete. Where the bolts are set to accommodate a certain size rail, difficulty is experienced



Details of Eccentric Grip Washer

if renewal is necessary with rails of different sections. For these bolts have been set for a particular width of rail base, and usually will not fit another width.

The accompanying illustration shows a type of grip washer which is used by the Canadian Pacific Railroad to hold down a section of rail with steel supports, where a variation in bolt holes could not be readily taken care of. The bolts for fastening were set with sufficient space

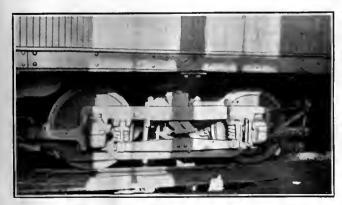
between them so that they would accommodate the largest rail base to be used, and variations from this were secured by the use of the eccentric washer.

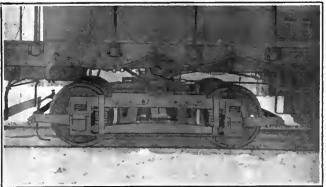
This washer consists of two parts, an upper circular disk with a conical base made to fit the fishing angle of the rail, and a lower part which consists of a square boss made to fit against the edge of the rail base. The square portion was not made concentric with the bolt hole, but was offset in two directions so that no two sides of the square portion are at the same distance from the center of the hole. With the dimensions selected, the distance from the bolt hole to the square side was made to vary by intervals of 1 in., from a minimum of 3 in. to a maximum of 11 in. This would thus provide for a total rail base variation of 3 in, without change in the fastening bolt.

Getting a Few Years More Life Out of Old Track

TEARLY two years ago the railway company in Mason City, Iowa, installed some seventy of the joint boosters made by the Dayton Mechanical Tie Company. In spite of the fact that they were placed in the winter time by a force that was entirely unfamiliar with their use, the railway company reports that they have proved "very satisfactory indeed." The joints involved an expenditure of about 10 per cent of the reconstruction cost for the stretch of track in which the joints were used, and they give promise of securing several years further use of the track that the company is satisfied could not have been repaired in any other way.

The track in which these boosters were laid consists of 30-ft. lengths of 60-lb. low T-rails laid on cedar ties in solid concrete with a concrete





Original Truck Designed for Outside-Hung Brakes

Remodeled Truck with Transoms and Inside Brakes

ties was inadequate as to depth, but The joint angles were tightened and the surface concrete was excellent, in some cases renewed and rewelded joint plates were cut off and the aid of a vertical bending device.

The concrete below the boosters inserted in the concrete. The bolted joints had loosened, and to the rail and to the base plate of the rail had battered, cupped and be- the booster, and the nuts on the come surface bent. With the con- joint bolts spot welded. Some of the crete cut out around the joints, the surface bends were taken out by the

New Equipment Available

Variable Speed Transmission

THE accompanying illustration shows a variable speed transmission device applied to a drill press. This equipment is being placed on the market by the Driscoll Transmission Corporation, New York, N. Y. It replaces the usual method of cone pulleys and belts to provide different speeds. Through the use of this de-



Variable Speed Transmission for Drill Press

vice the speed may be varied at will to that desired within the capacity of the machine by turning the control wheel. The machine is reversible and entirely inclosed to keep out dust and dirt.

Device for Lowering Welding Voltage

HE Electric Arc Cutting & Welding Company, Newark, N. J., has developed an adjunct for direct current arc welding. It consists of a magnetic switch together with a potentlometer for lowering the directcurrent voltage to that desirable for arc welding. An additional feature consists of provision for adjusting the voltage at the arc as desired. This can be from 20 to 25 volts for metallic arc, or 40 to 50 volts for carbon arc. This does away with the ugly flare and a deep crater resulting from high-voltage direct-current The magnetic switch rewelding. mains out until the electrode is touched to the work. The closing of the circuit then brings the switch in, which holds the voltage at the desired low value. Should this value be exceeded, the switch automatically opens the circuit.

Railway Switch Point Protector

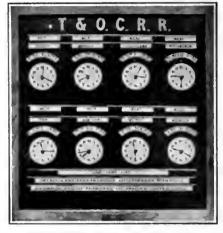
AN ACCOMPANYING illustration shows the Mack railway switch point protector which is being marketed by J. R. Fleming & Son Company, Inc., Scranton, Pa. The protector consists of a guard plate made of manganese steel and installed about 2 in, ahead of the switch point. The plate is shaped to conform with the head of the rail. Four bolt holes are formed in it to receive the fastening bolts and the heads of the bolts rest in a channel plate made to conform to the space between the flange web and the head of the rail. The object of the protector is to reduce the wear on the end of the switch point, to reduce the jar of impact on the switch rails and to avoid possibilities of derallment due to a loose switch point or the switch not shutting tight on account of an accumulation of snow or ice.



Rallway Switch Point Protector

Board for Announcing Car Departures

NEW TYPE of board for an-I nouncing the departure of electric railway trains or cars is being introduced by the Leu Perpetual Time Table Advertising Company, Chicago, Ill. It consists of a series of clock dials mounted on a base in a frame and covered with a glass door. The individual clock dials serve to indicate the time of departure or arrival of trains from a given point



Board for Announcing Arrival and Departure of Cars

or destination. This type of board is intended to replace the blackboard and chalk system used for indicating the arrival and departure of cars.

Protection of Feeder Sections on Railway Lines

NEW automatic feeder sectional-A izing contactor, that automatically cuts out of service feeder sections on which short circuits or overloads occur and returns them into service again only when the trouble has been cleared, has recently been placed on the market by the Westinghouse Electric & Manufacturing Company. The contactor opens on overloads and recloses only when the potential difference between the feeder sections is sufficiently small to limit the flow of current on reclosure to less than the overload setting on a relay.

An overload relay, a main contactor, a holding relay, a snap switch. fuses, a resistor and terminals, constitute the equipment. This apparatus is assembled on a slate panel and mounted in an asbestos-lined wooden box for outdoor service.

The main contactor is of the clapper type, with a blowout coil and an arc chute. The overload and holding relays are similar to each other (ex- receiving hopper is connected to a cept for the coils). Both relays are signal bell and to a visible register automatically reset, the moving core dropping back by gravity and spring pressure when the operating coil is de-energized.

The overload relay has an operating range of from one to two, so that the relay can be set for any desired load within wide limits. The holding relay can be arranged to release the main contactor on a difference of potential between feeder sections of from approximately 30 volts to 100 volts or even higher.

Change-Making Machine and Fare Box

THE accompanying illustration shows a change-making register designed by the Springfield Change Making Register Company, Springfield, Mass. This device is a combination of a change-making machine and the Springfield fare box designed by the same company, making a complete fare-collecting equipment which provides a record of each fare collection at the same time change is given to the passenger.

The fare box section shown at the right is of the locked type and includes all the improved features of the Springfield fare box. The receiving hopper, a casting of aluminum alloy, has a large, free passage admitting tickets as well as money, and is carefully baffled so that money cannot be drawn back through it by any mechanical means.

In the receiving chamber at one side of the inspection plate is a telltale ball, mounted on a vertical staff in such a way that if the box is overturned the ball rises to the top of the staff and is held there by a latch underneath the plate, which cannot be released until the box is returned to the office and opened by an inspector, who may, of course, make an investigation of the overturning of the box.

The money drawer, a single piece aluminum alloy casting, carried in an opening at the lower part of the casing, is locked into the casing by a Yale lock and can be removed only by an authorized person who is provided with a key. There is, in addition, an automatic locking device that retains the drawer in the casing, independently of the Yale lock, until the inspection plate has been tripped and held down, discharging all coins on the plate into the drawer before it can be removed.

The push button shown beside the

inside the glass receiving chamber by means of which the car operator registers the number of passengers entering the car. This eliminates the overhead register with its connections and fittings.

The change-making section, shown at the left, consists of two batteries



Combination Change-Making Machine and Fare Roy

of vertical tubes, five tubes in a row. placed one row behind the other, inclosed in a plate glass casing. Five operating slides below them are arranged so that each slide controls a tube in the front row and its corresponding tube in the back row. A handle for each slide projects through the front of the casing. A casing which is a single casting of aluminum alloy supports the tubes and incloses all the working parts, also the money drawer for the fare box section and a separate drawer for receiving the record checks referred to further along. At the side of the fare box is a change cup into which the passenger's change is delivered through a spout.

The front set of tubes is loaded with coins so arranged in the tubes as to provide the correct change for the fare paid out of the coin tendered by the passenger when the proper operating slide is moved, as one out of a dime, one out of a quarter, two out of a quarter, the change being delivered by the movement of the operating slide to the change cup at the side of the fare box.

The rear set of tubes is loaded with metal checks which make the record of the fare paid when the passenger requires change. the slide handle below a change tube is pulled to make change, checks are dropped from the corresponding rear tube into a separate locked drawer in the lower casing; one check if one

fare is paid, two checks for two fares, and so on. At the same time the change is deposited in the change cup. The change cannot be deposited in the change cup without at the same time dropping the recording checks into the check drawer, and an automatic lock is provided in each check tube, so arranged that if the checks in any tube are all used, or so nearly used that there are not enough left to make a complete record of the number of fares being paid, the operating slide is locked and no more change can be issued from the corresponding money tube.

The money tubes are open at the top so that they may be replenished as needed by the conductor, who provides himself with change for that purpose. There is a separate cover with lock for these tubes and a lock in the base controlling the operating slides so that the conductor can lock the machine if he is obliged to leave the car. Provision is made in the operating slides for adjustment to meet changes in the rate of fare. The money and check tubes are perforated so that the amount of money or checks in each tube is visible.

The complete box is about 24 in. high, 16 in. wide, 8 in. from front to back and weighs 40 lb.

Transfer Abuse Prevented by New Issuing Device

NTIL recently the Tri-City Railway operating in Moline, Rock Island and Davenport lost considerable revenue by the abuse of the transfer privilege. Presenting of invalid transfers was practised most consistently and flagrantly on certain lines carrying factory workers. With the ordinary punched type of transfer, the time indicated was not easily visible and in case an old transfer was detected, for the conductor to prove that he had received it from a certain passenger was practically impossible, especially in rush Transfers punched "a.m." hours.



Aluminum Box for Use with Tear Transfer System

were being used at the indicated hour in the afternoon.

To correct this misuse a new type of transfer was developed which is torn off at a length according to the hour. The car operator can distinguish at a glance between a.m. and p.m. transfers because of the marked difference in length. Various colors are used for the different directions and lines for which transfers are issued. For holding and issuing the transfers a wooden box having several compartments was constructed and attached to the air pipes below the brake valve. An improved box has recently been adopted that is made by Nic Le Grand, Inc., Rock Island, Ill. It is made of cast aluminum and designed with a cleat like a fare box so that it is removable. The pad of transfers is inserted under a U-shaped bar which holds a constant pressure on the pad so that after the pad has been adjusted at the end of each trip a transfer can be torn off with one hand. The compartments of the box are for holding tickets and extra transfer pads.

Differently colored transfers are used for each line of a system, or where a line runs in two directions from the traffic center, and where lines parallel each other, which affords an opportunity for the passenger to double back on a transfer, separate colors are used for each end of the line. The date is printed in large figures and provision is made for punching the month at the extreme edge. The hours in fractions are so arranged on the transfer that the later in the day when torn off the longer will be the transfer. A system of keeping transfer records and issuing transfers to the operator so as to eliminate waste is a part of the Tear transfer system.

E. T. Anderson, superintendent of transportation, claims that the box is almost indispensable with one-man operation. All the equipment in Davenport and Rock Island was changed over to complete one-man operation about ten months ago.

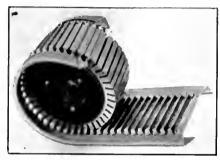
Portable Lamp Cord for Rough Usage

THE Okonite Company, Passaic, N. J., is placing a new flexible unbraided portable cord on the market. It has the trade name of "Okocord" and has double tinned conductors scientifically stranded, insulated with Okonite, braided with dry white and black cotton, and inclosed in a jacket of smooth, tough, inde-

structible 60 per cent Para rubber. This new product is designed particularly for use in rough, wet or oily places, such as is encountered in electric railway shops.

New Type Motor for Shop Use

IN A NEW a.c. motor recently marketed by the Louis Allis Company of Milwaukee, Wis., a somewhat novel construction is used for the rotor windings. The motor is designated as the L-A type H.D. and the entire winding of the rotor consists of an integral sheet of cop-



Rotor Winding Punched from a Single Sheet of Copper

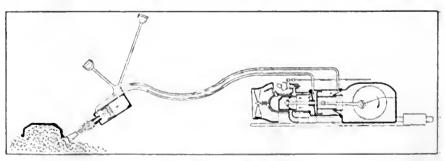
per punched and formed by a special mechanical process. This one-piece winding is machine-wrapped around the rotor core, the copper bars being expanded into the core slots by swaging, as indicated in the accompanying illustration. The multiplicity of joints contained in the ordinary type rotor is thus done away with and the single joint necessary which extends through the two end rings is silver welded, after which the metal at both con-

trical characteristics of the new motors and they are guaranteed to carry their full rated load continuously with a temperature rise not exceeding 40 deg. C., and after their ultimate temperature has been reached to carry 25 per cent overload for two hours, with a temperature rise not exceeding 55 deg. C. The motors are made in standard industrial sizes, voltages and frequency.

Rapid Blow Tamper

NEW TYPE machine for forc-**1** ing crushed rock under ties is being built by the Krupp Works in Germany and was described in a recent issue of the Krupp Monthly. There are two air connections from the compressor to the tamper. One of these is on the exhaust side of the tamper piston, the other on the driving side. The movement of the tamper piston is actuated by intermittent air pressures supplied by a two-cylinder forced air-cooled benzol motor. Due to the differential action of this two-step air pump, the return of the tamper piston is much slower than its outward stroke. As constructed, about 1,400 impacts per minute are produced as compared to thirty by hand operation. This high speed results in a practically constant forward travel of the crushed rock.

In order to relieve the operator from undue strain, the tamper is provided with two handles located at an angle of 90 deg. to each other. The air compressor equipment together with the fuel reservoir, tools and spare parts are mounted upon skids to facilitate transportation.



New Tamper and Compressor

nections is processed by means of a contracting operation that hardens the copper at the point where the heat, applied during the welding, has softened it.

The rotor core is a self-contained unit and may be pressed on and off the shaft readily. Particular attention has been given to the elecFigures given regarding the saving which results from the use of this machine indicate that approximately 40 per cent is saved in the actual time and labor, but as a tie with rocks forced under it by the machine will require considerably less attention than one tamped by hand, thereal saving is about 60 per cent.

Association News & Discussions

Results Obtained with High-Speed, Light-Weight Interurban Cars*

Some Operating Data Obtained with These Cars on the Western Ohio Railway, Which Has 112 Miles of Track-Improved Service and Increased Revenue Result-Accident Hazard Reduced

> By E. B. GUNN Superintendent of Transportation & Equipment Western Ohio Railway, Lima, Ohio

IN JANUARY, 1918, abnormal oper- lay (on which the two-hour schedule is ating conditions forced the Western still operating) we make the 32 miles Ohio Railway temporarily to change its interurban service from a one-hour schedule to a two-hour schedule. Competition from the automobile and motor truck made it impossible to go back to the hourly schedule with the heavy cars then in use.

Realizing that two-hour service was not adequate for our territory, we began, in the fall of 1920, to investigate the light-weight interurban car proposition. In the neighborhood of Cincinnati we found two properties that had been operating cars weighing 24,000 lb. and 25,000 lb., with an energy consumption of about 14 kw.-hr. per car-mile as against the 2.8 kw.-hr. used by our 66,000-lb. car. In April, 1921, we placed an order for eight cars to be 45 ft. long over all, 34 ft. 3 in. over corner posts, 8 ft. 82 in. wide over all, 10 ft. 9 in. from rail over trolley board and 32 in. from rail to floor with a seating capacity of forty-two plus seats for six passengers in the baggage compartment. These cars were to weigh not more than 33,000 lb. complete, equipped with four 35-hp. motors. It was specified that the cars must make the same or better running time from Piqua to Findlay (80 miles) than we had been making with our former equipment. This time was three hours and twenty minutes.

NEW SPRING SUSPENSION SUCCESSFUL

The cars were delivered early in September. They bettered our running time by five minutes, but did not ride comfortably at speeds greater than 30 to 35 m.p.h. The trouble was with the spring suspension. Below this speed the link used for suspending the elliptic spring appeared to take care of the side motion, but above this speed there was a serious jerky side motion with operation over an average track. The builders then devised a new set of spring links for suspending the elliptic spring, the head of each link being fastened rigidly to the truck frame. The cars now ride perfectly at any speed.

We are now operating between Piqua and Lima, 47 miles, in one hour and fifty-four minutes; from Lima to Find-

*Abstract of paper read at meeting of Engineering Council, Central Electric Rail-way Association, Louisville, Ky., Jan. 18, 1923.

in one hour and fifteen minutes and a six-minute layover is allowed at Wapakoneta for loading baggage, etc., there being at this point a connection with cars from St. Marys and Colina.

QUICK ACCELERATION PERMITS MAKING OF FAST SCHEDULE

We are making our schedule more easily than with our former equipment. At Findlay we make connections with lines from the north, and often hold trains ten or fifteen minutes. We find that they can still get into Wapakoneta on time, 47 miles from Findlay. The cars make speeds as high as 53 m.p.h. in some cases. We make our schedule on account of the quick acceleration, due to the lightness of the cars and to having full voltage at the motors. These cars require but 175 amp. to start them. Since we have been using these cars, we can shut down one rotary converter in each of our substations during the day.

As to operating costs, as compared with the heavy car, the energy consumption of the new car for November and December last averaged 1.45 kw.hr. per car-mile in November to 1.5 kw.-hr. maximum in December, due to heavier riding, snowstorms, etc. cars make 76,000 miles per month, and average 309 miles per day.

The following table shows the comparative lubricating and brakeshoe

costs:

45,000 to 50,000 miles more before requiring welding and turning.

The cost of trolley wheels will probably be 40 per cent less than with the old cars. We are having no trouble with the wheels spitting or burning, because the current drawn by the cars is small.

Track maintenance should be reduced materially, even though we still operate heavy freight service. This freight service is, however, low speed, so that once the track is put into condition it will not require the attention that it would with the high-speed passenger service.

MAINTENANCE COSTS REDUCED

We have reduced the cost of labor in the shops by the wages of seven men, and if it were not for the maintenance of the equipment we would need three or four men less. Of course the maintenance of the new cars costs nothing as yet, as they require only inspection and lubrication. We have been able in November and December to save about \$2,100 per month at the shops, covering labor and material.

As to the effect of collisions on these cars, we have had about as many collisions with automobiles with the new cars as with the old ones, but none of these was serious, because the cars could be stopped quickly. As the cars are low, we find a tendency to push a vehicle ahead of the car rather than to tip it over. The occupants of a vehicle with which a collision occurs are not liable to be injured seriously. As far as damage to the bodies of the new cars is concerned, they have stood up as well as the old equipment. A collision usually means only new glass in the front and straightening up of the corner posts and steel front of the car. This work can be done cheaply and the car is soon back in commission.

Since the light-weight cars have been in operation our receipts are increasing. For the last three months of 1922 they

LUBRICATION COSTS

	51 lb. tule, 165 lb. tule.	 3.95 or 5.42 12.78 or 19.3	cents per thousand car-miles cents per thousand car-miles cents per thousand car-miles
December, 1921,			cents per thousand car-miles

BRAKESHOE COSTS

November,	1922.	36 at 57 cents.		cents per thousand car-miles
December,	1922,	51 at 57 cents.	 29,07 or 38.8	cents per thousand car-miles
		95 at \$1.10	 104,50 or \$1.57	per thousand car-miles
December,	1921,	125 at \$1.10	 137.50 or \$2.02	per thousand car-miles

The 26-in, wheels that we use under these cars cost \$22.50 each as against the cost of \$41.66 each for the 36-in. wheels formerly used. It appears that we shall get two-thirds of the mileage that we did from the old wheels, as our cars have made approximately 35,000 miles and the flanges are still in good They will probably make condition.

have been ahead of 1921, whereas for the first nine months of the year they were behind practically every day. We believe that this equipment is going to be the salvation of our property, as it will enable us to compete with other means of conveyance and enable us to provide a service that will appeal to the traveling public.

Governor Smith's Recommendations Criticised*

Investment Bankers Consider the Legislation Recommended Will Impair Utility Credit and Retard Expansion-Municipal Authorities Too Interested to Act Judicially

> BY HENRY R. HAYES Chairman Committee on Public Utility Securities, Investment Bankers' Association

Jan. 3 recommended legislation with respect to public utilities which requires the immediate and serious attention of the association.

The principal recommendations are:

The principal recommendations are:

1. To abolish the present Public Service Commission and to substitute therefor three commissioners (to be appointed by the Governor) to be charged only with authority to regulate "such utilities as will not be regulated by cities, either because they operate outside the corporate limits of a city or because the city may, by proper resolutions, request the State to do it."

2. "That in the preparation of the legislation to abolish the present Public Service Commission, the power heretofore held by the cities over the terms of their franchises be returned to them."

3. "That the cities themselves should be permitted to purchase, build, own and operate 'public utilities' when a municipality determines this to be in its best interests."

4. "That the Transit Commission in the city of New York be abolished and all its powers with regard to the laying out of routes and supervision of construction be transferred to the Board of Estimate and Apportionment, to be exercised by this body through any agency which it may select, and that "its regulatory powers should he restored to the Public Service Commission Act, which will contain the provision that a city may be the agent of the State for carrying out these powers unless it should by proper resolution, request the State to relieve it of the duty."

There are two main desires expressed in these recommendations:

(a) The practical abolishment of statewide regulation of public utilities and the substitution therefor of municipal regulation, and

(b) Municipal ownership of utilities where cities may so elect.

Prior to the delivery of the Governor's message the advanced news reports in the public press indicated that a very radical change in State regulation would be recommended, and your president endeavored, but without success, to have an interview with Governor Smith in order to apprise him of the views of this association. It was felt that the proposal alone of a very radical change in the regulation of public utilities in the State of New York would be alarming to investors.

In a discussion of these matters we must bear in mind that the situation with respect to the rapid transit and surface lines within the City of New York is special unto itself on account of the nature of the contractual relations existing with the city. Therefore, this phase of the problem will not he presented at this time by your committee.

Owing to the fact that credit of public utility companies and therefore confidence in the securities thereof have

IN HIS message to the Legislature been created especially in States where of New York Governor Smith on there has been conservative and indicial there has been conservative and judicial regulation as well as freedom from local or political influences, your committee now feels concern over that part of the recommendation which has to do with the regulation of utilities other than the transportation systems in the city of New York.

GOOD FAITH OF STATE IS INVOLVED

For a great many years the policy of statewide regulation of public utilities has been the established policy of the State of New York. In fact, New York was one of the first states to recognize this principle. It has been followed, as we know, very generally by other states throughout the country advantageously in the public interests. Furthermore, recognizing the great advantages of judicial regulation, protection of the public interests and freedom from political influences, especially up State, investors have freely placed funds in these utilities with all the risks attendant to these investments. When viewed in this light, the good faith and moral credit of the State is involved. Investors would not have continued so freely to support the much needed expansion of utility services by investment in their securities had they expected these industries to be again subjected to the danger of political control and local regulation.

This association, through its members, has in a very large measure been responsible for the providing of these investment funds. Surely, therefore, it is incumbent upon us to study the situation seriously with a view to giving constructive suggestions to the end that conditions which make consideration of such legislation possible may be remedied. In this way only can we progress and not retrace our steps a long way backward.

It seems pertinent, therefore, for us to inquire just what exists in this New York State situation which makes it possible to disregard the experiences of that and other states in this country.

VOTERS DON'T UNDERSTAND SITUATION

Preeminently, there stands out the fact that the voters of this state cannot understand or appreciate the real interest which they have in seeing to it that companies be honestly financed, managed and regulated and that only in this way can they, the voters, be furnished with adequate service at reasonable costs. Furthermore, it cannot be definitely recognized by the public as a whole that with proper regulation and the advantages which that supervision brings in the nature of protection to

investment values and the creation of fair capitalization, public utilities are prohibited from making undue profits. Indeed, under sane regulation their profits are very limited when compared with the privately owned industrial concerns. Investors are quite willing to accept this restriction, but they must be afforded stability of interest and dividend returns, safety of principal and freedom from attack incident to local or political controversies.

The chief purposes of state regulation of public utilities are:

(a) To plan economically a development of service without regard to the corporate limits of any one locality, and to determine the extent and character of such service so that it shall meet al! demands in the territory served and respond promptly to the increasing requirements of growing territory.

(b) To establish the fair investment values created for the service, and to fix the interest rates of return on such values sufficient to attract the ready flow of money into the business as

needed

The individual consumer or user of utility service concerns himself chiefly with the price of the service. cheaply can he get it? He takes little or no interest today in the protection of the investor's money which provides that service. As a matter of fact any customer of public service, if he understands the problem, must admit that he is more interested in good service than in cheap service, and he can be shown: that although a poor and underfinanced company can give him cheap service, only a prosperous company can give him the best service.

MUNICIPALITY TOO INTERESTED TO ACT JUDICIALLY

Were a municipality to undertake the regulation of utilities within its corporate limits with the same broad powers now vested in the State Public Service Commission, the agency created by the city for this purpose would, among other duties, be required to act in a judicial capacity in determining the fair investment values upon which to base a rate of return and the charges for service, to produce this required re-As representing its citizens. turn. the City has a partisan interest in the determination of such important matters. We thus see the city in a rôle-acting as a special double pleader for one side of a controversy on the one hand, and acting on the other hand as judge to decide the merits of a case as presented by both parties. Wellmanaged private business is not conducted under such procedure and there is no reason why public business should tolerate it.

The above are merely some of the important points needing emphasis in a broad plan of education in the economics of the public utility business which must be conducted in the State of New York to make clear to the voters the advantages of State wide regulation of public utilities. Much of this must necessarily be carried on by the managements of the privately owned prop-

^{*}Abstract of loterim report presented to be heard of governors of Investment Abstract of foretin report presence the board of governors of Investi Bankers' Association of America by committee on public service securities adopted by the board on Jan. 12, 1923.

erties in a manner to create confidence. With reference to Governor Smith's recommendation that municipalities be given the right to purchase, build, own and operate public utilities, it is certainly the opinion of this association,

supported by the indisputable results of public operation, that except in a very few instances municipally owned properties have not been successfully operated. On the other hand, they have almost invariably proved unsatisfactory to the tax payer and to the public served. The most recent experiment, namely, that by the city of Detroit, is

already furnishing serious and difficult

It may not be wise or expedient now to deny that a community ought to have the right to own and operate properties if it so elects. In view of the consistently poor record of federal, state and municipal operation of utilities, it is certainly our duty to challenge the wisdom of municipal ownership and operation. In any case where such legislation is proposed, it is essential to see that provision be made for the purchase of existing properties at fair values in order to avoid the evils attendant on competitive plants long recog nized as distinctly undesirable from all points of view. To those who desire to study the results of public operation we commend the findings of the special committee of the Merchants' Association of New York in its report dated Jan. 23, 1919. The study made of government ownership and operation of public utilities by that committee was very comprehensive and we quote the following:

Except under war conditions the sole plea that can be advanced to justify the operation by governments of public utilities is that governments can provide better service at less cost to the public than can private operators; that is to say, the assumption that government operation is more efficient and less costly than private operation.

We do not believe that this contention can be sustained. On the contrary, we contend that the operations of governments in the economic field, and particularly under American conditions, are generally characterized by inefficient management and excessive cost; so that under government operation the public would get poorer service and pay more for it than under private operation suitably regulated by public authority. The cause of inefficient management and excessive cost when governments undertake economic activities is simple. All the activities of any government are necessarily carried on by political machinery and that machinery is wholly unsuited to the economic field.

The fields of politics and economics are dissimilar and separate. The field of poli-

nomic field.

The fields of politics and economics are dissimilar and separate. The field of politics (meaning thereby the art of government) is mainly the regulation of conduct and the protection of rights. The field of economics is the production and utilization of material things. The principles, the methods and the machinery of political administration are wholly different from those of economic activities and not adapted nor adaptable to the latter. The differences are fundamental and cannot be reconciled. When, therefore, the machinery of political action is applied to economic undertakings, it works badly and makes impossible the perfect co-ordination which alone, in the economic field, produce efficiency and economy of operation. A hrief comparison of the machinery of business with that of political action, will show clearly why political machinery does not and cannot work effectively in the field of economics. The fields of politics and economics are

Briefly, to summarize the New York situation, your committee unanimously feels:

1. That the legislation recommended by Governor Smith will create a lack of confidence on the part of large and small investors within and without the State, including insurance companies and savings banks, thereby seriously impairing the credit of utility companies and, accordingly,

2. That until such time as the policy of statewide regulation is reaffirmed definitely, the expansion of utility serv-

ice will be greatly retarded.

Your committee believes, therefore, that this association should take an active stand against any legislation intended to carry out the special features of Governor Smith's recommendation discussed in this report, and recommends that the Board of Governors at this time give public expression to their disapproval of the legislation which is proposed.

A Foreman's Relation to His Men and His Company*

An Analysis of the Qualifications Needed in a Successful Foreman, Together with Some Observations on the Advantages of Employment with an Electric Railway Company

> By F. G. Buffe General Manager for the Receivers, Kansas City (Mo.) Railways

ELECTRIC railway work is not easy but should encourage the making of in any department; but it has compensations. It is not monotonous; it has a compelling interest, and it gives an opportunity for initiative, tact and cheerfulness. There are no lay-offs, no shut-downs, no idle seasons, no strikes, no interruptions.

In the electric railway organization the link which connects the employee and production, on the one side, with direction, management and planning on the other, is the foreman, or assistant superintendent, or supervisor, or whatever he may be called. He forms the spirit of direct contact between employee and management. A foreman is chosen because he possesses certain qualifications, among which are: absolute knowledge of every job under his direction; ability not only to handle men but to lead them; willingness to accept responsibility and the obligations that go with responsibility; qualifications for promotion to higher position, and ambition for self-improvement.

A foreman must have executive ability and a thorough trade education. In addition, he must be able to judge men, have a deep sympathy with their troubles and be able to inspire their confidence. Energy, perseverance, thoroughness and self-control are also necessary. And the foreman must have a true realization of the value and dignity of his job, its responsibilities and obligations.

Job knowledge is so apparent a qualification as almost not to need special mention. A foreman is at the same time an instructor. He must be a competent and skilled workman, an expert operator, an accurate judge of work and machines, a judge of good work and an equally good critic of poor work. He must be able so to direct his men that the things they do may be done in accordance with the best methods.

The foreman must keep in touch with developments in his work. Where faulty and time-losing or material-wasting methods are being used, he must be alert to correct them. He must not only be prompt to make suggestions himself,

*Abstract of a paper read before the Shop Foremen's Association of the Kansas City Raiiways, Dec. 13, 1922.

the proper method of introducing a new man to the job. He should lead in safety first work and keep a careful eye out for safe practices on the part of every man and machine under his direction.

The ability to handle men and to lead them is the first mark of difference between a workman and a foreman. The scientific management of men is a professional equal to that of the teacher. It demands a deep study of human nature under all conditions and above all calls for an every-minute application of the square deal.

DEFINITION OF EXECUTIVE ABILITY

The ability properly to handle men is acquired, although some have more native genius for it than others. A good definition of it is this: The art of producing the greatest amount and best quality of work at the lowest cost and in the least time with the greatest amount of satisfaction to all concerned.

A good foreman is concerned not only with his company's interest but with that of the workers. This implies friendly help, constructive criticism, encouragement, proper supervision, a square deal in every act, just discipline, no favoritism and broad sympathy with, and a thorough understanding of human nature. A conscientious foreman should learn something of the home surroundings of his men, their troubles and ambitions. He should be ready with a helpful word, timely advice, or a bit of sympathy.

A foreman must be able and willing to accept responsibility and its obligations. When a worker is elevated from the ranks, he becomes a leader, charged with the duty of governing. He can no longer think with the mind of a workman; his viewpoint must change; he is a part of the management. Many men when given authority are unwilling or unable to quit the mental attitude of a worker and adopt that of the new position. In other words, they have not awakened to the dignity or value of the job.

A good foreman should possess or acquire those qualifications which will fit him for promotion. He should constantly strive to learn more of his job, and should study and develop his talent so as to be ready when the call comes. Opportunities for study and development are on every hand.

In conclusion emphasis should be laid on four qualities or characteristics which are essential to success. These are: Tact, sincerity, loyalty, and initiative. The foreman has been placed in a position of trust and responsibility. He is the channel through which orders are transmitted, and he is charged with the duty of getting the work out of his department in the quickest time at the least cost. To him has been deputized the part of management. The management's policy must be carried to the men through him. He is an indispensable link in the chain,

No Steam Railroad Exhibits This Year

OLLOWING the announcement that Following the announcement of there will be no convention during 1923 of mechanical division, V. American Railway Association, the executive committee of the Railway Supply Manufacturers' Association announces that its 1923 exhibits will be postponed. This decision was reached after a thorough understanding as to the wishes of the several divisions of the A.R.A. with which the R.S.M.A. has been associated. The R.S.M.A. executive committee understands that it is the plan of divisions V and VI, A.R.A., to hold strictly business meetings during 1923. The executive committee believes that this action will meet with the approval of the members.

American Association News

Equipment Committee Organizes for Active Season

THE committee on equipment of the Engineering Association met at the association headquarters in New York on Jan. 12 and inaugurated detail work for this year. Those present were F. II. Miller, Louisville, Ky., chairman; Daniel Durie, Connellsville, Pa., sponsor; Walter S. Adams, Philadelphia, Pa.; Louis J. Davis, Brooklyn, N. Y.; Charles Gordon, Chicago, Ill.; J. L. Gould, Wilmington, Del.; M. O'Brien, St. Louis, Mo.; E. D. Priest, Schenectady, N. Y.; P. V. C. See, Akron, Ohio; Karl A. Simmon, Pittsburgh, Pa.; C. W. Squier, New York, N. Y., and W. G. Stuck, Lexington, Ky.

The subjects assigned to the committee were discussed in detail and subcommittees were appointed to make investigations and collect data. The subcommittee appointed to study gearing is Mr. O'Brien, chairman, and Messrs. Davis, Gordon, Hazlewood, Hipple, Priest, Stuck and Taurman. This committee is to secure the co-operation of gear manufacturers in the study which will be made and their representatives will be invited to the next meeting of the sub-committee. A questionnaire will be sent to operating companies requesting desired information.

The sub-committee appointed to study various devices for trolley contact, together with the effect upon trolley wire, will comprise J. L. Gould, chairman, together with Messrs. Davis, Gordon, Hipple, Priest, Stuck and Taurman. This sub-committee will use a questionnaire in connection with its work.

As a sub-committee to review existing standards with the idea of possible revision and for presentation to the American Engineering Standards Committee, the following were appointed: C. W. Squier, chairman, and Messrs. Adams, Gordon, A. J. Miller and See. This subcommittee was directed to consider changes in the association specifications for rubber hose and to confider the consider changes in the association specifications for rubber hose and to confider the consider the confider that the confideration that the confiderati

operate with the association's representative on the American Engineering Standards Committee dealing with this subject. The question of tolerances for the bore of gears was discussed and will be included in the committee's work for this year.

A new subject to receive consideration this year is that of spring supports for railway motors. From the discussion which took place and the various data which have already been collected, it appears that this subject will prove interesting and beneficial. P. V. C. See, chairman, and Messrs. Adams, Davis, Gould, Hipple, O'Brien and Priest will comprise the sub-committee to consider this subject.

The subject of dust guards for bearings was discussed, and it appears that no standards for these have been developed as yet. The equipment committee believed that such standards ought to be prepared, and a sub-committee was appointed to consider this subject, as follows: Charles Gordon, chairman, and Messrs. Adams, Davis and Gould.

Purchases and Stores

A MEETING of the Engineering Association committee on purchases and stores was held in New York on Jan. 16, with the following members in attendance: B. J. Yungbluth, chairman; W. S. Stackpole, vice-chairman; R. H. Dalgleish, sponsor; Jackson P. Dick, H. H. Lloyd, J. F. Fleming, W. C. Bell and W. H. Staub.

The committee having been assigned the subject of reviewing the 1921 report of the joint committee on stores accounting, the discussion of this report at the 1922 convention was first considered. The committee concluded that the report as originally submitted should be approved and that the material classification recommended therein should be adopted by the association.

A sub-committee was next appointed to prepare a detailed statement ex-

plaining the use of the classification code, for the benefit of those who may desire to put it into effect.

After recommendations made by Mr. Dick concerning the enlargement of the scope of activities of purchasing agents and store keepers in association work had been considered it was decided that the committee would make a formal request to the executive committee to arrange for a session of purchasing agents and store keepers at the next annual convention. The session, of course, will be entirely aside from presentation of the committee report at the regular engineering meeting. The committee expects to present with its request a comprehensive program of the special session and will conduct an active publicity campaign to make the meeting a success. Chairman Yung-bluth then appointed Messrs. Dick and Lloyd as a sub-committee which will be in charge of the program for this special session.

Next, the report of the 1922 committee on purchases and stores was discussed. The importance of reaching a definite decision regarding the material classification and forms recommended therein was considered essential to the determination of proper inventory methods. It is expected that definite decisions in regard to these matters will be reached at the next meeting, which has been tentatively set for March 5.

Traffic Regulations

THE committee on traffic regula-THE committee on training tions of the T. & T. Association held a meeting in Chicago on Jan. 17. Previous reports of this subject were reviewed, and it was decided that each member of the committee should write a brief description of the traffic situation in his city, along the lines of the traffic survey of Baltimore, which appeared in the Jan. 13 issue of the Elec-TRIC RAILWAY JOURNAL. These articles will be reviewed later on by the committee, and recommendations will be made based on the situation in these large cities. A questionnaire will be sent to a number of railway companies, to determine the situation as to antiparking regulations and limitation of track use by vehicles. These companies will also be asked to tell about the progress of methods for improving the handling of traffic in congested centers, with particular reference to limitation of left-hand turns, segregation of vehicle traffic, semaphore control of traffic, location of passenger stops, oneway streets, etc. The report of the committee will show a number of photographs of congestion along street railway lines in various cities.

Those who attended the meeting were: H. B. Flowers of Baltimore, chairman; Frank P. Edinger of Chicago, Henry O. Butler of St. Louis, F. R. Cogswell of Pittsburgh, also J. V. Sullivan and John E. Wilkie of the Chicago Surface Lines.

It is likely that another meeting of the committee will be held about May I.

The News of the Industry

Rapid Transit Body Complete

Transit Development to Be Planned for Detroit Based on 3,000,000 Population

The rapid transit commission for the city of Detroit has been completed by the naming of Andrew H. Green, president of the Charcoal Iron Company of America, as the fifth member of the The other members are commission. Sidney D. Waldon, chairman; Clarence W. Hubbell, former Detroit city engineer; Willard Pope, civil engineer, and H. W. Alden.

PROGRAM FOR RAPID TRANSIT

D. L. Turner, consulting engineer of the New York Transit Commission, has been retained as consultant by the Detroit commission and an estimate made of the commission's budget requirements with which to carry out the survey. The commission will make a survey of the city's rapid transit needs, supplementing the report of Parsons, Klapp, Brinckerhoff & Douglas, which was completed about four years ago.

The City Engineer's office, the Department of Public Works and the Department of Street Railways will all be asked to aid the rapid transit commission in working out a program for a

rapid transit system.

Acting Mayor John C. Lodge has outlined a fourfold task for the commission, visualizing a population of 3,000,000 for the city of Detroit in 1950, within the 20-mile radius. The immediate drawing of a budget is advised by Mr. Lodge, for although the sum of \$50,000 has been placed at the disposal of the committee by the Council for preliminary expenses, this money can only be drawn upon after the acceptance of a budget.

Four or more construction programs for rapid transit are to be drawn up by the commission and a sound financial plan evolved to be submitted to the electors for decision at the April elec-

tion, 1924.

OUTLES OF COMMISSION OUTLINED

The essential duties of the commission are outlined as under the following four heads:

1. Study of the records of the city of Detroit and other large cities having similar rapid transit problems.
2. Consult with foremost authorities on urban rapid transit and related subjects.
3. Prepare building and financial plans.
4. Collect and preserve all such records, drawings and documents as may be of use, and readily turned over to the Department of Street Railways or other departments as may be designated by the Mayor.

The Detroit Board of Commerce has made a suggestion that a general manager be employed for the Department of Street Railways, which according to H. H. Emmons, president of the board, was prompted by the thought that a general manager ought to be appointed before the coming election to remove the Department of Street Railways from the plots and counter plots of politics. Mr. Emmons voiced the belief of the board that the question of management of the Department of Street Railways should be settled as a business matter immediately and not become an element of politics.

The fact was pointed out that since the resignation of former Mayor James Couzens, the street railway system has been in the hands of three very capable men whose interests necessarily are centered on their own individual husiness, and although every man in the present administration is doing the best that can be done under the circumstances, the commissioners are working under difficulties because authority is not centralized as it is in other city departments and in successful businesses.

The board will co-operate with the Department of Street Railways in making a complete survey of the municipal system with a view to submitting a report and recommendations for future developments.

\$338,000 Added to New Orleans Rate Base

Mayor McShane of New Orleans, La., cast the only dissenting vote at the Commission Council meeting on Dec. 26 against the financial report filed by the Public Service Company adding \$338,000 to the base amount on which the rate of fare and the income of the company are to be computed. The report, dated as of Sept. 30, raised the rate base to \$49,348,226 and showed that the total stock issue permitted at that time under the agreement between the utility officials and the representatives of the city was \$8,104,913.

The report, showed that the gross income for September of the street car lines was \$670,769; electric power and light, \$299,859; gas, \$185,266; while the operating expenses were: Street car, \$393,011; electric plant, \$162,939; gas, \$101,198. The total gross income was \$1,155,859 and operating expense \$657,-149, leaving a profit of \$498,745, from which were deducted a tax item of \$113.568 and uncollectable bills, \$1.375, giving a net profit of \$409,220 after adding an item for miscellaneous income of \$9.535.

From this the company deducted, as allowed by the agreement, \$100,000 for renewals and repairs and \$71,757 for miscellaneous expense, leaving \$238,105 which the report showed had gone back into the funds of the company for additional upbuilding. An additional \$100,-000 was added to cover payments made on car trust certificates.

\$11,360,000 Scheme Probably Dead

Canadian Border Municipalities Vote Against Ambitious Electric Railway Project

The municipalities between Port Credit and St. Catharines, Ont., registered an adverse vote on Jan. 1 of more than \$7,500,000, expressed in terms of money, on the hydro-radial scheme for a line between these two points, estimated to cost \$11,360,000 odd. As the Financial Post of Toronto sees it, unless some ingenious way can be found to revive the proposal and thousands of dollars more are spent in propaganda work to induce balky communities to take another leap the project may be regarded as dead as a door nail.

Under the so-called Drury act the government provided machinery bv which interested municipalities could have another chance to declare themselves on the matter if they wished to de so and, further, the government guarantee of bonus to the extent of the \$11,360.000 would remain effective should the verdict at the polls be favorable. A stipulation was made, however, that if municipalities representing 15 per cent of the total liability went against the undertaking it would be considered defeated. Fifteen per cent of the total estimated cost of the road would have been slightly more than \$1,707,000. What has actually happened, says the Post, is that upward of 70 per cent has been rolled up against the venture.

There were thirteen municipalties in all concerned in the original scheme which was first voted on Jan. 1, 1917. Saltfleet and one of the Flamboro townships never would allow themselves to be courted by the Hydro officials from the very first and legislation was got through hy which the other eleven places, without a revote of the electors, would be required to absorb the portion of liability which had been charged up against these townships. It seemed for a while as though the radial promoters might get their enterprise through on this basis, but the Sutherland Commission came along in 1921 and by a majority report gave the whole project a black eye. Then the Drury government performed a surgical operation on the hydro-radial act which was in force at that time and created a new act which practically stated that if the qualified voters of the municipalities from Port Credit to St. Catharines were really anxious to invest their millions they could have one more try by voting on by-laws an agreement on Jan. 1, 1923. In order, though, that there might not be any empty dreams about the government's guarantee of bonds to finance the road the Drury administration inserted the 15 per cent disability clause.

The municipalities which went against the scheme with the amounts for which they were to become liable are as follows: Hamilton, \$5,869,286; Saltflect township, \$1,002,296; North Grimsby, \$424,077; East Flamboro township, \$266,626; West Flamboro township, \$66,626; and Barton township, \$284,484, making a total of \$7,913,438, or about 70 per cent of the \$11,360,000.

Louisville Carhouse Partly Destroyed

Fire broke out at 11:45 p.m., on Jan. 15 at the Fourth Street carbouse of the Louisville Railway. As a result fourteen double-truck cars, fifteen singletruck cars and six trailers were destroyed, while a number of other cars were slightly damaged. The fire started in one of the cars in the L-shaped carhouse. The loss is estimated at \$350 .-000 by President James P. Barnes, who also reported the company as insured. A few cars were still in service at the time of the fire. Cars on the south side of the house were not damaged to any extent. Most of the loss was of equipment used on the Fourth Street line. but normal service was resumed on the morning of Jan. 16, the first car leaving the carhouse at 4:32 a.m., a temporary dispatcher's office having been established in a car. The company has fiftyfive one-man cars on the way from the manufacturers. It doesn't expect to have any trouble in taking care of its service. The work of the fire department was pronounced as being exceptionally good by the officials of the railway.

Conductors Arrested for Using Mutilated Coins

Federal authorities in Chicago, on Jan. 10 arrested two conductors for using mutilated coins with intent to defraud. A claim has been made that conductors were using flattened dimes to beat the fare boxes on the cars of the Chicago Surface Lines. Secret Service agents made an investigation and, as a result, they caught two conductors in the act. These men were Isaac Kraft and John Farrell, who had been in the company's service fifteen in the company's service fifteen waived examination, and is said to be ready to plead guilty. Farrell was held for the Grand Jury.

These men were arrested for violation of Section 165 of the Federal Criminal Code, under which they are subject to a fine of \$2,000 or imprisonment of five years, or both penalties. It is said that these two conductors flattened dimes so that they had the diameter of a penny and wou'd register as such—thus defrauding the company of 9 cents each time the trick was worked.

The Secret Service agents of the government said this is a serious offense and they have successfully prosecuted conductors under this Section in other cities.

Revised Franchise Will Be Submitted

Resolutions Adopted Seek Old Franchise With Modifications—Bondholders' Approval May Result in New Election in April

Another attempt is to be made to obtain a resumption of street car service in Saginaw, Mich., with motor coach extensions to sections of the city not served in the past by the cars.

A revised franchise that was defeated at the polls Nov. 7, will be submitted. Just how radically different from the other it will be, is not known, as it will depend upon the attitude of the bond owners protective committee of the bankrupt Saginaw-Bay City Railway Company.

LITIGATION ENDED JAN. 10

The litigation in the Circuit Court ended on Jan. 10 when in an opinion by the two judges nearly 1,000 "Yes" votes and several "No" votes were declared invalid. But this action seemed only to spur on the proponents of street cars to try again, and at a subsequent meeting of eighteen civic organizations summoned by the Board of Commerce, resolutions were adopted asking the trustee in bankruptcy, Otto Schupp, to agree to the same franchise with eleven modifications that seemed to be objectional last November. Mr. Schupp has not answered the resolutions, as he is to submit them to the bond owners for their approval.

It is planned, if they meet with the bond owners' approval, to ask the Council to submit the franchise at the election April 2, and if they refuse then start the circulation of petitions to initiate the franchise as was done last November.

The franchise that was defeated provided for the following rates of fare to obtain for two years, ten tickets 50 cents; four tickets 25 cents; 10-cent cash fare; universal transfers. After two years if the Council or the grantee were unable to agree, the Public Utilities Commission was to fix the rate of fare. The term of the grant was twenty-five years, and the company was to be relieved of all paving and repaying but was to pay for all extra ballast necessary because of the construction of its tracks, and was to keep the paving in repair between and 1 ft. outside the outside rails.

NEW WORK PRESCRIBED

Certain new work was to be done and a time limit was fixed. It meant a rehabilitation of the property. As there was some doubt about enforcing that part of the contract which was included by correspondence between Mr. Schupp and the bond owners' committee, the recent meeting incorporated the following in the proposed franchise to be submitted; not less than \$400,000 was to be expended for improvements and equipment. The Council is to receive a detailed statement of expenditures and the right for a city audit of the books

was included. Two thirds of the board of directors are to be Saginaw men. No by-laws are to be passed to deprive any of the Saginaw directors of their rights under the state law. Provision also is made that the directors hold stock in the company that they may qualify.

Other provisions of the franchise are: That the company is to be distinct from all other local utilities. Books and rec-ords are to be kept in Saginaw so they will be available for inspection at all times. That the grantee will in four months resume complete operation. Council given authority to restrict business district operation of freight cars on the Michigan Railroad within one year from date of the acceptance of the franchise. The Council be given the right to require the company to substitute new transportation when initial means becomes obsolete or impracticable. That the franchise may not be construed to restrict or in any way affect operation of motor trucks or taxi-

Of the eighteen representatives present seventeen were in favor of the above provisions. The exception was against the last grant and he took the position that disputes and rates of fare should be adjusted at home and not by the utilities commission. He also objected to the length of the grant.

When the franchise was last submitted it lacked the necessary 60 per cent for approval by fifty-seven votes. It is not known what the final count will be made until the board of canvassers completes its work under the Circuit Court opinion. Eight hundred "yes" ballots were declared invalid because of blundering by election inspectors, all but thirty-four votes in one election precinct being thrown out and 296 in another.

COUNCIL OPPOSED TO FRANCHISE

The council to a man was opposed to the franchise, yet it attracted an affirmative vote greater than ever accorded any municipal proposition or candidate in the history of the city and the negative vote against the measure is the chronic "no" vote registered against all public matters a study of the votes on various questions shows not only at the last general election but other years as well.

Although the franchise lacked a few votes of adoption on two occasions recently Mayor B. N. Mercer has conferred with George L. Bidwell of New York, president of the Trackless Transportation Corporation, relative to the installation of a motor bus company in Saginaw. As to the progress that has been made nothing definite in regard to the progress of the matter is known, as the chief executive refuses to make any statement on the subject.

It is expected, however, that Mr. Schupp will shortly be prepared to answer the resolutions, at which time, if the resolution can be included in the franchise, an active campaign will be started to have the measure approved by the electors.

Mr. Mitten's Letter to a Stockholder

In a recent issue of "Service Talks" T. E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, in replying to a letter from one of the stockholders of the company said in

It gives me pleasure to know that you are satisfied with the results secured by this management. The recent retirement of certain efficiency men need give you no concern, since the operating economies which they were brought here to effect have all been accomplished. The work is now being effectively done by carefully trained men, advanced from the ranks, who are in closest sympathy with the Co-Operative Plan.

men, advanced from the ranks, who are in closest sympathy with the Co-Operative Plan.

"One-man management" is a term coined by our adversaries, which can be only truthfully applied if "every-man" is meant. The secret of our present and future success does and must lie in operating officers who are in sympathy with the workers, so that the every-day watchfulness of our 10,000 employees may continue, and their experience be made more and more useful in perfecting our operating practice.

Competent assistants, from the ranks of our own employees are being carefully trained to fill every position of consequence, including my own, to the end that this great work shall go on uninterruptedly, the confidence reposed in me by the stockholders fully justified, and the participation by the men in the ownership of this property intelligently perpetuated.

"The loyalty and co-operative efficiency of our employees is unparalleled. These employees are stockholders who have voted to make the payment of the last 10 per cent of their annual wage conditional upon their first having earned and paid the fixed charges of the P. R. T. system and a dividend of 6 per cent to P. R. T. stockholders. This is the greatest possible assurance that the P. R. T. dividend will be continuously earned. Organized labor has no righteous cause against us.

In the matter of P. R. T. publicity, the money cost is believed to be most wisely expended in the advancement and protection of this property. I would ask that you regard these publications as a means of setting forth the facts relating to the various problems confronting this property before the three interested parties—the car rider, the employee and the linvestor. Only by frank statement and fair dealing has it been possible for P. R. T. men and management to secure such a large measure of public confidence.

New Jersey Governor Rans

New Jersey Governor Raps Utilities

George S. Silzer was inaugurated Governor of New Jersey at Trenton on Jan. 16. In his inaugural address to members of the Legislature the new Governor recommended a legislative investigation to fix the prudent investment value of the various railway properties in New Jersey and predicted that a fare of 5 cents or less would be possible. He bitterly denounced the street railways for watering stock and declared that if they had properly handled their business there would have been no need for an 8-cent fare today. In requesting the lawmakers to investigate the property value of these concerns, he asserted that as he had conceived that value, after study, he was sure it would bring about a 5-cent fare and later a further reduction. This value, however, would, according to the Governor's plan, only be fixed after advice from the Public Utility Commission.

After this proposed investigation the new Governor recommends that a sliding scale basis be adopted for future fare charges. Starting with a 5-cent fare, according to his idea, the companies should be permitted to earn 6

per cent on prudent investment. the profits increased, then the fare would be reduced to 4 cents and the companies permitted to earn 8 per cent and so on, producing an equitable decrease of fare and a corresponding increase in dividends.

In connection with this attack upon the street railways, the Governor said that the same principles involved should apply to the various light, heat and power companies. In solving this whole problem, he said, there are but two equities to be considered-the security holders and the public-and after carefully weighing the right of both he declared that the equities are in favor of the "innocent public," and asserted that "we must follow the course that brings this result."

Cost-of-Living Chart Presented

The Boston (Mass.) Elevated Railway explains in Co-operation for January, 1923, that in July, 1920, Mr. Doherty made an award of 70 cents an hour as the maximum rate for conductors and motormen. It says that in view of the fact that the cost of living as published by the Massachusetts Commission on the Necessaries of Life has, of late months, shown an increase, attention has been directed to the reduction in the hourly rate mutually agreed upon. As in the discussion of the eight-in-ten hour law in the bulletin issued March 15, 1921, it is explained that it is the desire of the management that all questions be considered fairly, intelligently and upon the facts. In consequence it has presented a chart which it says should be the basis upon which consideration of the subject rests.

Doherty Directly following the award, the cost of living declined rapidly, and while during the last few months it has increased, the company says it is about at the same point as in 1918, when the War Labor Board made the award of 48 cents an hour. Examination of the chart also indi-

cates, says the company, that the War Labor Board and the Endicott Award raised the rate per hour to the cost of living line, and the Doherty award raised the rate slightly in excess of the increase in cost of living.

Since that award, the agreements mutually entered into have provided a margin between the downward fall of cost of living and the decrease in rates, so that today, allowing for the change in hours per day, the maximum 61cent rate is 24 per cent above the cost of living line.

The trustees of the company referred to the reduction being less than the fall in the cost of living as follows:

1. The fact that although a substantial decrease has aiready taken place in many items affecting the cost of living, that cost is not yet upon any settled basis, so that it is peculiarly a fitting time to put in practice the belief of the trustees that to be consistent they should be as deliberate and conservative in following the cost of living when it is upon a downward trend as in following it when it is in an upward movement.

as in following it when it is in an upward movement.

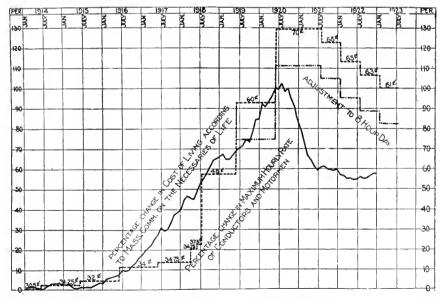
2. The fact that they thoroughly appreciate the co-operation that the men have given to the management during the past year. The existence of this spirit has financial, as well as other value, in the conduct of this service.

3. The fact that as public officials they are in charge of a public business and should be careful not to follow any other rule than that of a full fair wage for work that is earmestly performed.

It would not seem difficult to keep up the spirit of co-operation and service to the car riders under such conditions nor have much concern for a future which has not as yet arrived. yet arrived.

\$1,220 Goes to Safety Teams

The Nashville Railway & Light Company, Nashville, Tenn., distributed a cash bonus of \$1,220 last Christmas. This sum was divided among the safety teams which had taken part in the accident reduction contest starting Oct. 1 and ending Dec. 19. The number of accidents for the year just ended, namely 1,680, shows a reduction of 489 as compared with the 1921 total. It was pointed out by railway officials that these figures are significant in view of the fact that traffic and congestion had increased considerably in 1922 due to the increased number of automobiles.



Boston Elevated Cost of Living and Wage Chart

Financial and Corporate

Receiver for Oueens Line

Company Has \$7.694.394 of Unfunded Debt-Interborough Advanced Company \$7,000,000 - Will Ouit Now

Gen. Lincoln C. Andrews, who has been executive officer of the New York Transit Commission for the last two years, was appointed receiver for the New York & Queens County Railway on Jan. 18 by Justice James C. Van Sielen in the Supreme Court, Long Island City. Application for the receivership was made by W. W. Green of Alexander & Green, attorneys for the Bankers' Trust Company, trustees for outstanding bonds of the company.

ROAD A DRAIN ON INTERBOROUGH

The New York & Queens County Railway is a subsidiary of the Interborough Rapid Transit Company and the application for a receivership followed the recent declaration of Colonel Grayson M. P. Murphy, the new chairman of the executive committee of the Interborough board of directors, that the Interborough Company would no longer pay the recurring deficits of the Queens County Company but would concentrate its resources in improving its existing rapid transit facilities and in co-operating with the public authorities to build new lines.

Announcement to this effect was made on Jan. 15 by Colonel Grayson M. P. Murphy, the new chairman of the executive committee of the Interborough board of directors, following a conference with a delegation of residents of Queens. Colonel Murphy promised the Queens residents that the Interborough would co-operate in every way in the reorganization of the company and would continue to furnish it power to prevent any break in operation.

\$781,000 NEEDED FOR IMPROVMENTS

The New York & Queens County Railway now owes \$350,000 in taxes and the city has judgments for paving amounting to \$237,206. The total unfunded debt of the company is \$7,694,394.

The three controlling reasons which impel the Interborough Company to take action now are these:

1 For the Interborough to continue the operation of the Queens County lines will require a further advance of funds for both capital expense and to make up defects. The Interborough management feels that all their resources should be devoted to improving the service of the subway and elevated.

The Interborough management 2. The Interborough management has come to the conclusion that its sole function should be that of providing rapid transit and that accordingly it would relieve its officers of the responsibility for the management of lines which present a different and a difficult problem in themselves.

3. In view of the foregoing, the interborough company should retire immediately and allow an independent interest to obtain possession of this property and thus develop it for the promotion of public convenience.

Some idea of the drain which the Queens County system has been upon the Interborough can be gathered from

the fact that during the past twenty years the Interborough has advanced to the Queens County lines nearly \$7,000,000. During all of these years there has been a substantial operating deficit, and in 1922 the receipts from the operation of the Queens County lines were \$450,000 less than the actual expense for operation.

The Transit Commission's engineers have estimated that \$781,000 of new money will be needed to put the lines in first-class operating condition. The most valuable parts of the system, the Steinway lines, comprising practically all the tracks east of Woodside and separating the lines now operated by the company from Manhattan, are being operated under a receivership obtained by the holders of the underlying bonds of the old Steinway Railway. Passengers traveling over the two parts of the once united system now not only have to pay two fares but to change ears. Slaughter W. Huff, president of the Third Avenue Railway, and Robert C. Lee are receivers of the Steinway Railway.

Preferred Stock Payment Plan Announced

The directors of the Alabama Traction Light & Power Company, New York, N. Y., have proposed to the holders of the \$1,000,000 of 6 per cent preferred stock a plan for funding the acerued dividends in order to permit of the payment of future dividends in cash. A provision is made that any shareholder who is unwilling to accept payment in stock will receive an undertaking from the company to pay such dividends in eash at a future date. A dividend of 48 per cent has been declared on the preferred stock covering the cumulative dividend periods to Dec. 31, 1922, payable to shareholders of record on that date on surrender of the warrants either in preferred stock at par or on or before Dec. 31, 1925, in each without interest. Option of exchange must be exercised before Aug. 1, 1923. All new stock issued in payment of dividends to shareholders exercising this option will be entitled to 6 per cent dividends cumulative from the date of issue.

Dismantling Work Under Way

Work of dismantling the Springfield & Washington Railway, operating between Springfield and South Charleston, Ohio, was started Jan. 2. Order permitting the company to discontinue service on the line Dec. 31 was issued some weeks ago by the Ohio Public Utilities Commission.

All of the material with the exception of 3 miles of track will be sold as junk. These 3 miles of track will be used by the Baker Wood Preserving Company to provide switching facilities.

Refinancing Plan Made

American Railways Would Pay Accumulated Dividends on the Preferred Stock in Additional Stock

Plans have been announced for refinancing the American Railways, Philadelphia, Pa. Accumulated dividends amounting to 194 per cent on the \$4,000,000 (par value \$100) 7 per cent first preferred stock of the company will be paid in additional preferred stock if two-thirds of the holders of the common and preferred stocks of the company approve.

Future quarterly payments on the first preferred stock also will be paid in the same manner until there has been accumulated out of earnings after Jan. 1, 1923, a surplus of \$1,000,000. Thereafter, the plan states, if earnings of the company warrant, eash dividends on the preferred stock will be resumed. A special meeting of stockholders will be held in Camden, N. J., on Feb. 1 to act. on the plan.

The plan also provides for sale by the company of all its common stock equity in the Ohio Valley Electric Railway, Ironton Electric, Boyd County Electric, Lynchburg Traction & Light and Roanoke Traction & Light Companies to the Consolidated Light, Heat & Power Company, which is owned by the American Railways,

The Consolidated Company will issue approximately \$7,000,000 of bonds and \$1,500,000 of cumulative 7 per cent preferred stock, the proceeds of the sale of these securities to be used in paying the American Railways for the stock of the other companies, a total of approximately \$7,500,000, the remainder to be used for installation of new power equipment.

The plan further provides for redemption of \$3,000,000 of 71 per cent gold notes of the American Railways, due Feb. 1, 1925; retirement of not less than \$1,000,000 of its five-year 8 per cent notes; extension of the Wilmington & Chester Traction Company collateral trust gold extended 6s, due April 1, 1923; retirement of the \$4,000,000 second preferred stock and an increase in the authorized first preferred stock from \$4,000,000 to \$8,000,000, and a change in the name to the American Electric Power Company.

Van Horn Ely, president, in a letter to shareholders, says:

The directors unqualifiedly recommend to the stockholders approval of the plan for refinancing, which in their judgment is a constructive one and places the company on a firm financial basis. The company has concluded arrangements with bankers who have agreed, subject to the satisfactory completion of the foregoing plan, to undertake the formation of a group for the purchase of all of the securities involved.

The directors of the company, according to Mr. Ely, are firm in the conviction that, if the earnings continue during 1923, as they have indication of so doing, the necessary surplus to warrant resumption of cash dividends on the preferred stock will be reached before the close of this year.

Approximately \$11,000,000 of new securities will be issued under the plan.

Ordinance Defers Tax Payment

With four negative votes and after an address by Councilman Edwin Kellogg, the Council of Cincinnati, Ohio, on Jan. 10 passed an ordinance deferring for six months payment of the \$350,000 franchise tax provided for in the service-at-cost franchise granted the Cincinnati Traction Company.

Councilman Martin referred to the fact that the recommendation for the deferment had been made to the Council by Mayor George P. Carrel's traction committee, members of which were of the opinion that an increase in fares resulting from a refusal of the Council to defer payment of the tax might seriously interfere with the adjustment of the traction problem. He also called attention to the fact that before the city could obtain any part of the money due under the franchise the company would collect \$160,000 due it as earnings under the franchise.

He said further that the deferment ordinance was introduced merely as a riding over measure until committees representing the Cincinnati Traction Company and the Cincinnati Street Railway could agree on a basis for the reorganization of the two companies. He promised that when that time came a new ordinance would be passed to take the place of the present service-atcost ordinance which would eliminate parts of the ordinance now found to be objectionable.

Bankers Suggest Purchase Terms Be Arbitrated

E. M. Sanderson, of Sanderson & Porter, was one of the delegation that waited on the members of the City Council of St. John and later on the government of New Brunswick in St. John, N. B. Others in the delegation were Henry R. Hayes, of Stone & Webster, New York City, chairman of the public utilities securities committee of the Investment Bankers' Association of America; O. B. Willcox, New York, counsel of the Investment Bankers' Association of America; R. D. Bell, Montreal, and E. C. Long, Toronto, representing the Bond Dealers Association of America, the former being the chairman of the public utilities committee of that body.

The members of the delegation asked the members of the City Council of St. John to arbitrate the dispute between the city and the New Brunswick Power Company over the question of purchasing the undertaking, and suggested a higher value in the street railway property than that fixed by the city. The city's offer of \$2,577,665 for street railway, gas plant, electric light and power plant and real estate was pronounced much too low. Several of the members of the City Council agreed to the view that the price was too low, but refused to listen to the suggestion that the dispute be submitted to arbitration. The delegation told the members of the City Council that continued hostility to the New Brunswick Power Company and refusal to offer

a figure higher than the sum named for the property would create an unfavorable feeling against St. John in financial circles.

At the meeting with the New Brunswick government, the delegation endeavored to induce the government to interfere and demand that the members of the City Council of St. John submit the controversy to arbitration. This the government has refused to do, stating the dispute is one wholly between the city of St. John and the public utility corporation.

Tentative Plan Drawn for B.R.T. Reorganization

A tentative plan for the reorganization of the Brooklyn Rapid Transit system formulated by protective committees for the two principal securities -\$74.520,000 stock and \$57,230,000 gold notes of 1921-has been submitted for consideration to committees representing other securities of the system. This is a step forward in the reorganization. which is not yet in shape for announcement of details.

According to the Wall Street Journal the tentative plan provides for a new issue of 6 per cent collateral trust bonds to replace existing 7 per cent gold notes of 1921, the exchange to be accompanied by partial payment in cash of accumulated interest since June, 1919. New bonds, if the tentative plan is adopted, will be secured by New York Municipal Railway first 5s, at present pledged under the notes. B. R. T. 5s of 1945 and the first refunding 4s of 2002, it is believed, are similarly to be replaced by the new 6s. The latter issues, owing to pending litigation involving priority of property liens, will require extensive negotiation before an agreement can be reached, but it is hoped by July 1, next, to have secured agreement of all interests. The amount of cash payable to noteholders has not been finally agreed upon; cash payments to B. R. T. 5s and 4s cannot at the present time be estimated with accuracy.

Stockholders, under terms of the tentative plan, will be asked to subscribe for new securities, principally collateral trust 6s, to the extent of approximately

\$35 for each share held.

Auction Sales in New York .- At the public auction rooms in New York, there were no sales of individual electric railway securities this week.

Would Tax Net Income .- A petition filed by D. A. Baldwin with the State Legislature on Jan. 11 asks that a tax be placed on the net income of electric railways of Massachusetts instead of the present franchise tax.

Abandonment Approved.—The stockholders of the Brooklyn (N. Y.) City Railroad on Jan. 8 approved the resolution which provided for the abandonment of the company's line beginning at the intersection of Furman Street with Fulton Street along Furman Street to Atlantic Avenue. Brooklyn.

Authorizes Disposal of Certificates .--The Northern Massachusetts Street Railway, Athol, Mass., has been authorized to dispose of \$25,000 of receiver's certificates. It was shown that unless the company was enabled to borrow money to pay certain bills it would have to cease operating its lines, which serve the section from Orange to Fitchburg.

Wants to Issue Bonds .- Pacific Gas & Electric Company Sacramento, Calif... has applied to the Railroad Commission for authority to issue \$5,490,000 face value of its general and refunding mortgage gold bonds and to deposit and pledge them with the Mercantile Trust Company under the terms of the company's first and refunding mortgage.

Railway Reorganized. - The York (Pa.) Railways reorganized on Jan. 8 and elected the following new directors: George E. Baker, Gordon Campbell, L. B. Harvey and Joseph W. Swain. A statement was issued showing the York Railways and its allied public utility corporations expended during the past year for improvements \$30,000.

Date on Valuation Argument Announced .- The Missouri Public Service Commission has set Feb. 15 as the date for the argument in the United Railways of St. Louis valuation case. Action was taken on request of former City Counsellor Caulfield, special attorney for the city, who asked for additional time to reply to company's brief.

Line Bought.—The Chicago, Aurora & De Kalb Electric Railroad, Aurora, Ill., was recently bought at a mortgage foreclosure sale in Geneva for \$90,000. It was bought by Israel Joseph, an iron dealer of Aurora. The line is 31 miles long and runs between Aurora and De Kalb. The new owner did not state whether he would junk the line or operate it.

Lake Pontchartrain Road Elects Directors.-At the recent annual meeting of the Jefferson & Lake Pontchartrain Railway, a subsidiary of the New Orleans Public Service Company, Inc., the following directors were elected for the ensuing year: R. S. Hecht, J. P. Butler, Jr., J. D. O'Keefe, Hugh McClosky, Joseph D. DeGrange, Harold Newman, A. D. Parker.

To Sell Preferred Stock .-- A license has been granted by the state securities commission to the Salt Lake & Utah Railroad, Salt Lake City, Utah, to sell 500 \$100 shares of its 7 per cent cumulative preferred stock at a discount of \$5 a share. A sales commission of 3 per cent has been granted by the commission. The proceeds of the stock sale will be used for new construction work.

Gold Bonds Offered .-- A \$3,000,000 offering is being made of the first lien and refunding 62 per cent gold bonds of the Central Power & Light Company, St. Louis, Mo. Upon completion of this financing the company will operate directly or through its subsidiaries thirty-two central electric power stations and do a gas, water and street railway business in sixty-three cities. Net Income \$1,258,487.—The Market Street Railway, San Francisco, Calif., for the eleven months ended Nov. 30, 1922, reports a railway operating revenue of \$8,744,616 and expenses \$6,288,408. The net income, which included no provision for federal income tax, sinking fund or betterments, amounted to \$1,258,487.

Traffic Decreases.—According to the annual report of the Nashville Railway & Light Company, Nashville, Tenn., there was a falling off in traffic in 1922 compared with 1921. There were 34,000,000 passengers in 1922 which represents a loss of 5 per cent. The mileage operated was approximately 5,350,000 miles which showed an increase in service rendered during the year.

Authorizes Abandonment.—On Sept. 26, 1922, the California State Railroad Commission authorized the Pacific Electric Railway to abandon a portion of its single-track line, 2.3 miles in length, and known as the Terracina line in the city of Redlands. That portion of the Terracina line abandoned was producing so little traffic as to justify discontinuance of service. The railway company has taken up its tracks.

Falling Off in Receipts.—In his annual message to the stockholders for the year ending Nov. 30. 1922, Gordon Campbell president of the York (Pa.) Railways states that the decrease in traffic from the peak of 1920, continued in the railway practically to the end of 1922. It was then that the normal increase appeared to show itself. Compared with 1921 the railway receipts showed a decrease of about \$20,000.

Special Dividends Declared.—The Columbus Railway, Power & Light Company, Columbus, Ohio, has declared a special dividend of 2½ per cent on the outstanding common stock payable Jan. 20 to holders of record on Jan. 10. No dividends on the common stock have been paid since 1917 when the quarterly dividend payments of 1½ per cent starting in May, 1914 were terminated.

Five Months Income Reported.—The passenger revenue of the Brooklyn (N. Y.) City Railroad for the five months ended Nov. 30, 1922, was \$4,861,766 against \$4,685,461 for the same period in 1921. Operating expenses and taxes increased from \$3,956,568 to \$4,016,433 for the five months ended Nov. 30 of this year. The net corporate income amounted to \$783,016 against \$633,876 for the period ended Nov. 30, 1921.

Gold Bonds Offered.—Fletcher American Company, Indianapolis, and Illinois Trust & Savings Bank, Chicago, recently offered \$973,000 twenty-five year first mortgage 6 per cent gold bonds of the Indianapolis, Columbus & Southern Traction Company, Columbus, Ind. The price was 100 and interest. The bonds are dated Feb. 1, 1923, and are due Feb. 1, 1948. The purpose of the offering was to refund an issue of first mortgage 5 per cent bonds due on Feb. 1, 1923.

Debenture Bonds Offered.—Bonbright & Company New York, N. Y., are offering at 90 and interest to yield about 6.70 per cent \$2,500,000 gold debenture bonds of the United Light & Railways Company, Grand Rapids, Mich. The bonds, known as Series "A" 6 per cent, are dated Jan. 1, 1923, and are due Jan. 1, 1973. The proceeds will provide funds for the retirement of the 8 per cent bond-secured gold notes due Nov. 1, 1930, which will be called for redemption at once.

Will Increase Common Stock.—The Indiana Public Service Commission has authorized the Lafayette (Ind.) Street Railway, Inc., to increase its common stock from \$125,000 to \$200,000 and to issue \$200,000 of twenty-year 7 per cent bonds. The corporation will withdraw and cancel its \$125,000 of preferred stock which was authorized but never issued. The new securities issue was authorized, it is said, to reimburse the company for capital expenditures made or contemplated.

Stock Issue Authorized.—The Alabama Traction Company organized by John B. Weakley, Birmingham, and associates to take over the electric railway systems in Albany and Decatur, Ala., was granted authority by the Public Service Commission to sell \$50,000 in common stock of the company and to issue \$150,000 of twenty-year 6 per cent mortgage bonds. The first mortgage bonds will be used in acquiring the property of the North Alabama Traction Company under the court's approval.

Property Transfer Made.—On Jan. 8 the Tiffin, Fostoria & Eastern Electric Railway transferred its property to the Tiffin & Fostoria Railway, recently organized to take over the line. C. F. M. Niles, Toledo, is president of the new company and Samuel B. Sneath, Tiffin, is secretary. Mr. Sneath was also secretary of the Tiffin, Fostoria & Eastern. The consideration was \$175,000, and the new company filed a mortgage for that amount to the Ohio Savings Bank & Trust Company, Toledo. No change in management is involved in the transfer, the line remaining virtually under the same ownership.

Warrant Basis Date Announced .-City treasurer and city comptroller of Seattle, Wash., have announced that Seattle's Municipal Railway fund will go on a warrant basis on Jan. 25, instead of Jan. 10, as first planned. With the fund on a warrant basis, employees will be unable to cash warrants with the treasurer, and banks will probably only eash them at a discount. A bond interest and redemption payment of \$1,243,975 is due Feb. 1. Of this amount, \$833,000 will be for bond redemption. This calculation does not take into consideration the payment of warrants Jan, 25, which will be approximately \$275,000.

Line Sold.—The Millers Falls branch of the Connecticut Valley Street Railway, extending from Turners Falls to Millers Falls, Lake Pleasant and Montague, Mass., has been sold to Michael Blassburg, a junk dealer, of Turners

Falls, who is about to dismantle the property. The branch was opened to traffic in June, 1895, and was prosperous for a time. The first setback was met with in the revoking of boating and fishing privileges on Lake Pleasant, and the rise of the automobile and the motor bus brought the branch to a condition regarded as hopelessly unprofitable. Service was discontinued recently.

1922 Better Than Previous Year .-The Stark Electric Railroad, Alliance. Ohio, carried 3,142,949 passengers in 1922. This was 348,600 more than in The banner month of the year was December when 296,169 were carried. In December, 1922, 9,000 more passengers were carried in the city than in the previous year. The income for passenger traffic for the year 1922 was about \$20,000 less than the income of the previous year. This was caused mainly by the reduction of fares in Canton and Alliance and the issuance of tickets between Louisville and Canton. Though the receipts from fares are lessyet the gross receipts the past year were greater than the year previous. There were fewer accidents in 1922 than in 1921.

Abondonment Order Issued.-Orders for the immediate abandonment of the New Carlisle junction branch were issued by Federal Judge Killits in Toledo, Jan. 15, according to announcement from the local headquarters of the Indiana, Columbus & Eastern Traction Company. The order comes as confirmation of a decision of the State Public Utilities Commission, set to go into effect at midnight Dec. 31, last, but held up by protests of residents along the line. At the same time, Judge Killits gave protestants to the abandonment of the Lima-Defiance division until Feb. 1 to raise funds to purchase the branch, after which date, unless sold, the Indiana, Columbus & Eastern is authorized to abandon service. No decision has been handed down in the case of the Columbus-Orient branch.

Northern Ohlo Electric Report Shows Big Gain .- The Northern Ohio Electric Corporation, Akron, Ohio, in its annual report for 1922 shows net income of \$122,544, or \$1.63 a share, earned for the 75,000 shares of common stock outstanding. This compares with a deficit of \$117,741 in the preceding year. Gross revenues totaled \$9,354,964, n gain of \$682,886 over 1921, but \$1,659,-881 less than in 1920, the record year. Net after taxes was \$2,457,191, and the balance after charges, but before depreciation and preferred dividends was \$482,544. After allowing for dividends on the preferred, none naving been paid since Dec. 1, 1919, there was net of \$122,544 available for the common. Bank loans were reduced by \$720,000 in 1922, partly by the use of funds derived from sale by the Kent Water & Light Company of its electric property to the Northern Ohio Traction & Light Company. The balance sheet shows cash of \$23,874 and securities \$9,762,222. Notes payable stand at \$2,880,000, construction reserve \$232,786 and surplus \$179,139.

Traffic and Transportation

Through Routes and Joint Rates

Père Marquette Required to Meet Demands Made Upon It by the Michigan Railroad

The Michigan Railroad has won a victory before the Interstate Commerce Commission over the Père Marquette Railroad and others. The commission has entered an order requiring the Père Marquette Railroad to establish through routes and joint rates in connection with complainant between points on complainant's line in the State of Michigan, namely Saugatuck, Vriesland, Forest Grove, Jamestown and Frankenmuth and certain interstate points on defendant's lines.

COMMISSION'S ORDER QUOTED

In the commission's own words:

In the commission's own words:

We find that complaint (Michigan Railroad) is engaged in the general transportation of freight and that, subject to the above iimitations, through routes and joint rates between Saugatuck, Vriesland, Forest Grove, Jamestown and Frankenmuth and various interstate points on defendants' lines are necessary and desirable in the public interest.

We will accordingly require defendants to establish in connection with complainant between Saugatuck, Vriesland, Forest Grove and Jamestown on both carload and lessthan-carload traffic, and Frankenmuth on carload traffic, on the one hand, and the interstate points from and to which through routes and joint rates are at present maintained in connection with complainant's Allegan-Battle Creek division on the other hand, through routes and joint rates which, as to traffic destined to points on complainant's lines, will not short-haul its connections, and which, as to traffic from points on complainant's lines, will reserve to complainant its long haul; provided, however, that such through routes and joint rates are not hereby required to be maintained over circultous routes.

The commission said that the record

The commission said that the record did not afford sufficient basis to enable it to prescribe reasonable rates or divisions of rates in connection with these routes and that if complainant and defendants are unable to agree upon reasonable rates, as well as just, reasonable and equitable divisions thereof. the matter may again be brought to the commission's attention.

The electric road operates lines wholly within the State of Michigan, extending from Saugatuck on Lake Michigan, through Holland, northeasterly to Grand Rapids, a distance of 44.8 miles; from Grand Rapids southerly through Monteith to Kalamazoo, 49.7 miles; from Battle Creek northwesterly, through Monteith on complainant's Grand Rapids-Kalamazoo division, to Allegan, a distance of 42.5 miles. and from Flint northerly through Saginaw to Bay City, with a spur to Frankenmuth, a total distance of 65 miles. The company's Flint-Bay City line has no physical connection with its other lines.

Practically all the steam carriers in the United States were parties defendant. The electric road or its predecessor started its freight business in September, 1913, by the purchase of the

Allegan-Battle Creek line from the Michigan Central. Through routes and joint rates are maintained by defendants in connection with complainant from and to all points on this line; the complainant having succeeded to the Michigan Central's tariffs.

In the proceeding just decided the electric road applied under section 15 of the interstate commerce act for the establishment of similar through routes and joint rates from and to points on its Saugatuck-Grand Rapids and Grand Rapids-Kalamazoo divisions, and on its Flint-Bay City division between Mount Morris and Bridgeport, and asked that the Interstate Commerce Commission prescribe the divisions of such rates. It alleged that the failure and refusal of defendants to establish such routes and rates constituted violations of section 1, paragraph 4; section 2 and section 3, paragraph 3, of the act, but it adduced no evidence in support of the alleged violations of section 2.

In its decision the commission said that the right of the electric road to relief under section 15 depended upon whether it engaged in the general business of transporting freight in addition to its passenger and express business, and was able to maintain in connection with defendants the through routes and joint rates prayed for; whether such through routes and joint rates were necessary or desirable in the public interest; that is, whether they were practicable and would substantially serve the convenience of the public; and whether by the establishment of such routes any of the defendants would be short-hauled.

Railway to Install Bus Service

East St. Louis Railway, East St. Louis, Ill., will install motor bus service about March 15 on a crosstown route, according to an announcement by President W. H. Sawyer. Three buses have been purchased. The rates of fare will be 8 cents, the same as on the electric railway cars, and transfers between buses and trolleys will be issued. Mr. Sawyer stated the bus service was an experiment and was made because it was inexpedient to extend the railway service at this time and that a crosstown trolley line was still a future possibility.

Will Provide Bus Service. - President Clark V. Wood of the Springfield (Mass.) Street Railway has indicated his willingness to provide a supplementary service by auto on condition that all jitneys now run are barred by the city. Mayor Leonard has approved such arrangement. The proposition will be put into shape for formal action by the City Council and the company. The term for which jitney licenses has been granted will expire on May 1.

49,036,746 Passengers at One Station

Compilation Made by New York Commission Shows Staggering Totals Handled at Busiest Traffic Points

Times Square and Brooklyn Bridge are the principal centres of rapid transit traffic in New York City. This statement is based on figures compiled from the reports of ticket sales at the various stations of the rapid transit lines of both the Interborough and Brooklyn Rapid Transit systems to the Transit Commission. The figures are for the fiscal year ended June 30 last. They were made public on Dec. 9.

While the ticket sales for both systems at Times Square, 49.036,746, are about 2,500,000 less than those at the Brooklyn Bridge centre, the latter includes not only the subway figures at the Brooklyn Bridge station, but the ticket sales of the Brooklyn elevated lines and the Second Avenue and Third Avenue elevated railroads there and the sa'es at the Chambers Street terminal of the B. R. T. system under the Municipal Building.

Considered as a subway centre alone Times Square is far in the lead, 49,036,-746 of ticket sales being contrasted with 14,984,289 at the Interborough Subway's Brooklyn Bridge station and 13,238,249 at the Chambers Street terminal of the B. R. T. under the Municipal Building, a total of 28,222,538 subway ticket sales at Brooklyn Bridge.

TIMES SQUARE TRAFFIC HEAVIEST

The Times Square figures, in addition represent a greater traffic concentration as the passengers who enter both systems at that point pass through the same entrances and passageways for the most part. The Times Square station is the largest, from the viewpoint of traffic, on the Interborough subway system with ticket sales of 31,966,237 for the year, more than 2,000,000 more than at Grand Central. The Times Square station is also the largest on the B. R. T. system, the ticket sales for the year having totaled 17,070,509.

If the number of passengers who leave the trains at Times Square be considered equal to the number who board trains there, then in the last fiscal year the number of persons who passed through the Times Square entrances and passageways to and from the interconnected Interborough and B. R. T. stations was equal to a figure only a few millions less than the population of the United States.

The Interborough traffic at Times Square represented an increase of 2.396.977 over 1921. The increase at the B. R. T. Times Square station was 2,495,936. In 1921 the Inter-borough traffic at Times Square exceeded that at Grand Central by only 170,000—these two being the leading Interborough stations - but in 1922 the ticket sales at Times Square sprang ahead and exceeded the sales at Grand Central by 2,028,000.

The Interborough fare collections—this term being interchangeable with ticket sales, which were partly discontinued by use of the new turnstiles—at Times Square alone were greater than upon the entire length of several of the subway branches, exceeding both the Queensboro subway and the Eastern Parkway line by several millions.

BROOKLYN BRIDGE FIGURES

Of the total traffic at the Brooklyn Bridge center, 13,908,471 were upon the Brooklyn elevated lines, 14,984,289 upon the Interborough subway, 13,238,249 at the Chambers Street terminal of the B. R. T., 3,408,400 upon the Second Avenue Elevated and 6,219,200 upon the Third Avenue Elevated.

Other important rapid transit centers follow:

FOURTEENTH STREET-UNION	SQUARE
I. R. T. Lexington Ave. subway	
Total	31,688,515
GRAND CENTRAL STATE	ION
I. R. T. Lexington Ave. subway.	29,938,128 1,290,300
Total	31,228,428
ATLANTIC AVENUE	
Pacific Street station	. 15,545,431 2,513,686 1,594,226 1,513,829
Total	. 26,167,172
BOROUGH HALL	
I. R. T. station	13,845,912 3,534,821 1,163,904 923,272
Total	19,468,409

The largest stations, from the standpoint of traffic, on the Interborough subway system, follow, with the figures of tickets sold or fares collected in the fiscal years of 1922 and 1921.

	 1922	1921
Times Square	 31,966,237	29,568,260
Grand Central	29,938,128	29,397,748
Pennsylvania Station.	25,009,251	23,071,850
14th St. (E. S. subway)	 16,966,522	15,862,000
Atlantic Avenue	 15,545,431	19,929,720
Brooklyn Bridge	 14,984,289	15,238,000
Bornugh Hall.	13,845,912	14,898,200
Fulton Street	13,530,045	14,803,100
14th St. (W. S. subway) 85th St. (E. S. subway)	10,266,101	10,161,200

The most important stations on the Interborough's elevated system were at Grand Street on the Third Avenue line with ticket sales of 7,534,600, a loss of about 330,000 for the year, Thirty-third Street on the Sixth Avenue line, which had 6 965,400, a loss of about 460,000, and City Ilall on Third Avenue line, with 6,219,200, a loss of 364,000.

The busiest stations on the B. R. T. subway system follow, with comparative figures for 1922 and 1921:

	1922	1921
Times Square	17.070.509	14,524,523
34th Street	14,223,072	12,666,574
Union Square	14,721,993	12,850,863
Brooklyn Bridge (Park Rows	13,908,471	14 299,521
Coney Island Termins!	13,868,226	12,116,339
Chambers Street	13,218,249	13,754,998
Emes Street	11,126,208	10,040,292
Cortlandt Street	10,466,224	8,467,502
De Kalb Avenue	2,552,027	7,862,448
and the same of th		-

The total Interborough subway traffic last year was 644,975,474, n gain of

about 5,000,000, and its total elevated traffic was 384,517,216, a loss of about 25,000,000. The total B. R. T. traffic, which is not segregated as to subway and elevated lines, because of joint operation, was 444,747,229, a gain of a little less than 40,000,000.

Six-Cent Fare Extended

Council of Binghamton Renews Railway Agreement—Order tor Two Men on Car Rejected

Six cents w.ll be the fare charged by the Binghamton (N. Y.) Railway until Jan. 15, 1924. The extension of the present fare agreement between the city and the company was authorized by the Common Council at the adjourned session on Jan. 12. An amendment to make it compulsory for the cempany to have crews of two men on each car was voted down.

The ordinance was adopted by seven votes, with three Aldermen opposed and three Aldermen absent. Seven votes were needed. The amendment was lost with seven voting against it, three opposed and three absent.

Previous to the action on the ordinance of Alderman Edward F. Roman on the 6-cent fare agreement, the special committee named to confer with the officials of the Binghamton Railway presented a lengthy report.

The report contained a statement of assets and liabilities of the company and the railway income account for the first eleven months in 1922, showing the net corporate income to be \$41,723 and the operating expenses to be \$595,-339. The total bonded debt of the company is now \$2,423,565.

TELL OF SAVING EFFECTED

In the report it is stated that the company effected a saving of approximately one-half cent per kilowatt by bringing power from Dalton, Pa., but the officials claim some of this saving does not show, as the new ears take more power. The cost of this improvement, it is stated, has not been charged to expense, in fact, has not been paid for as yet, as the company had an agreement with the concern doing the construction work that it was not to be paid for until the company was out of the hands of the receiver. The report also states that there have been no unwarranted expenses or increase in salaries of officers.

The committee also reported that the company has a considerable source of income from lighting contracts but the officers state and the figures show, the report says, that all of this has been used to pay for improvements and debts of the street railway system. In 1921 the railway made a profit of \$31,301. In eleven months in 1922 the company had profits of \$41,723.

The company's records show a remarkable decrease in business in 1922 as compared with 1920, as the company carried 328,469 fewer passengers in 1922 than in 1920. This is explained in part by the fact that there were 8,000 automobile licenses issued in 1920,

in Binghamton, as compared with 16,000 in 1922.

The scale of wages on Jan. 1, 1920, was 41-45 cents.

The present scale is the same for the two-man ears and 46-50 cents for the one-man cars.

In January, 1920, 174 men were employed on the ears.

At present 122 men are employed and actually running ears.

In January, 1920, fifty-two cars were available and in use.

At present sixty-nine cars are available and in use.

In 1920 1,987,904 car-miles were made as compared with 2,182 258 in 1922, an increase of 184,454 car-m.les.

There were eleven fewer boarding and alighting accidents reported in 1922 than in 1920, and eighty-seven more automobile accidents.

Every ear is thoroughly inspected every 1,000 miles and every 50,000 miles the ears are taken down from the trolley to the ground and all necessary repairs made. Care are repainted every eighteen months.

Boston Fare Policy Indorsed

"Neither sense, justice nor expediency" supports the suggestion of a 5-cent fare on the Boston Elevated Railway, according to the State Department of Public Utilities, which has filed with the Legislature a lengthy report on the transportation situation in Boston and surrounding cities and towns. As for Mayor Curley's proposal that any deficit in the cost of operation at a 5-cent fare be paid out of the tax levy of the cities and towns served by the company the suggestion is ridiculed.

The department indorses the present proposition of having the Elevated operated on the service-at-cost basis, under public trustees, and while opposing strongly the general 5-cent fare, approves the plan of establishing such a fare within certain zones, in accordance with the plans already put into effect by the trustees in certain cases.

The department recommends the establishment of a Metropolitan Transportation District to take over the lines of the Eastern Massachusetts Street Railway in East Boston, Chelsea and Revere and lease the same to the Boston Elevated. The longest haul on these lines would be approximately 4 miles.

The department recommends also the establishment within the metropolitan district commission of a metropolitan planning division, which would consider the whole subject of transportation and make recommendations from time to time as to improvements that might be effected in local service.

'The department recommends further that street railways should be relieved of the payment of all commutation taxes and should also be relieved from the expense of paving streets between rails. It believes that the subway rentals should be continued.

The recommendations of the commission will be reviewed at length in an early issue of the ELECTRIC RAILWAY JOURNAL.

Personal Items

A. E. Reynolds Joins Sanderson & Porter

Albert E. Reynolds, who recently resigned as general manager of the United Traction Company, Albany, N. Y., and its subsidiaries, will become associated with E. N. Sanderson of New York in the operation of gas, electric light, power and street railway properties. Mr. Sanderson is senior member of the firm of Sanderson & Porter, well known engineers and contractors, and is president of the Federal Light & Traction Company, which operates public utilities in various cities of the United States, with the principal office in New York City.

Mr. Reynolds began his railway career with Sanderson & Porter when they owned and operated the Plattsburg Traction Company at Plattsburg. He remained with the firm for eleven years, when the Plattsburg company was purchased by the Delaware &

Hudson Company.

His work in the organization and operation of the Plattsburg road won recognition from its new owners, and in 1909 he was transferred to Glens Falls, where he was promoted to general manager of the Hudson Valley Railway, a subsidiary of the Delaware & Hudson Company. In 1917 Mr. Reynolds was promoted to the general managership of the United Traction Company, the largest of the Delaware & Hudson electric lines. He also retained the general managership of the Hudson Valley.

Dean J. Locke with Public Service Railway

Dean J. Locke will enter the service of the Public Service Corporation of New Jersey on Feb. 1 as special enginear attached to the office of R. E. Danforth, vice-president and general manager of the Public Service Railway. Mr. Locke was graduated from the Worcester Polytechnic Institute in June. 1912, with the degree of B. S. in electrical engineering and since then has been in the employ of Albert S. Richey. He received the degree of electrical engineer at Worcester Polytechnic Institute in 1916. The work that Mr. Locke did for Mr. Richey was very broad in its character, including the conduct of car and equipment tests, the making of traffic surveys, the preparation of studies of wage trends and living costs and the interpretation of valuation data. In fact, Mr. Locke was resident engineer in entire charge of the inventory and appraisal of the Toronto Railway rolling stock in connection with the purchase of the property by the city. His work has also included car and equipment tests. The system in New Jersey with which Mr. Locke will become connected includes

eity suburban and interurban lines, but Mr. Locke's experience has covered engineering work on similar properties for which Mr. Richey has acted as consultant in the past.

O. D. Street McGraw-Hill Vice-President

Former Western Electric Official Is in Executive Charge of Transportation and Electrical Units of Publishing House

O. D. Street, well known for the past ten years as general manager of distribution of the Western Electric Company, has been elected vice-president of the McGraw-Hill Company, in executive charge of the Electric Railway Journal, Bus Transportation, Electrical World, Electrical Merchan-



O. D. Street

dising, Journal of Electricity and Western Industry and Industrial Engineer. Mr. Street brings to these publications a broad background of business training and a very extensive contact in the electrical industry.

Mr. Street entered the organization of the Western Electric Company in 1901 on his graduation from Williams and has a broad practical training. He was in charge of telephone sales on the Pacific Coast, assistant to the president, Atlanta branch manager, general telephone sales manager and latterly general manager of distribution. During the war he rendered invaluable service in reorganizing the warehousing division of the Quartermaster's Corps and establishing an orderly system of forwarding to Pershing's army where chaos had existed before.

Under his administration, the Western Electric system was expanded by the creation of twenty-two branch houses until Mr. Street was in executive charge of fifty jobbing houses distributing electrical supplies. This responsibility has entailed a personal contact with all sections of the country

and all branches of the industry gained in the service of central stations, telephone systems, industrial plants and contractor-dealers, in co-operation with the manufacturers of practically all classes of electrical products. He has become a recognized authority on the broad problem of distribution, now become one of the most pressing issues before the industries of America.

Mr. Street was born in Massachusetts in 1877. He be'ongs to the Bankers', University and Williams Clubs in New York and the Siwanoy and Pittsfield Country Clubs.

Harry Engle Made Street Railway Commissioner at Youngstown

Harry Engle was appointed street railway commissioner of Youngstown, Ohio, for a term of four years by Mayor William G. Reese on Jan. 15. The appointment has since been confirmed by the City Council. Mr. Engle succeeds William A. Sause, who served as first commissioner for four years, taking office Jan. 16, 1919, when the service-atcost ordinance became effective. Mr. Engle has been connected with public utility enterprises in various capacities since young manhood. At the time of his appointment as commissioner at Youngstown he was commercial agent for the Pennsylvania-Ohio Power & Light Company, Youngstown. Mr. Engle has appointed as his chief assistant A. W. Hartford, formerly manager Youngstown & Suburban Railway.

A. S. Davis Developing Plans for Power Expansion

A. S. Davis, who is assistant superintendent of power and lines of the United Electric Railways, Providence, R. I., was secured by his present employer on account of the plans for expansion of the power department which are now being carried out. Just previously he spent two years with Stone & Webster, Inc., principally on work in connection with the design of the new 130,000-kw. plant for the Hartford Electric Light Company. Before that he was for eight years supervisor of power plants for the Connecticut Company.

Mr. Davis began engineering work back in 1900, with Eaton, Chase & Company, installing steam and electrical machinery. After four years of this work, he entered Tufts College, graduating in 1908 with the B.S. degree. He then spent a couple of years with the J. G. White Engineering Corporation and one with the Electric Bond & Share Company, leaving to go with the Connecticut Company in 1911. He is a thorough and practical engineer, well versed in design and construction meth-He is right at home amid the bustle now in evidence at Providence, where new boilers to be equipped for burning pulverized fuel, a new turbine and much other new equipment are being installed.

Public Represented

Messrs, Blackmar, Niles and Metz All Elected Directors of Interborough Rapid Transit

The New York Transit Commission recently announced that it has designated as representatives of the public of the city in the reorganized board of directors of the Interborough Rapid Transit Company former Supreme Court Justice Abel E. Blackmar of Brooklyn, to serve for a full term of three years; William W. Niles of the Bronx, to serve for two years, and former Comptroller Herman A. Metz of Manhattan, to serve for one year.

The new board contains in all eighteen members, the successors of six of whom will be elected each year. It is in pursuance of this plan that the members designated by the Transit Commission are assigned one, two and three year terms, so that a successor to one of the three will be elected each year

for a full term.

Judge Blackmar was counsel to the first Public Service Commission appointed by Governor Hughes in 1907, but was made a Justice of the Supreme Court in the fall of the same year and at the ensuing election was chosen for the full fourteen-year term. He retired from the bench only a few days ago. He is thoroughly conversant not only with the rapid transit law, but with the organization of the operating companies and the statutory functions of the Transit Commission with relation to them.

Mr. Niles, who is a lawyer, is a member of the Bronx Parkway Commission, and in 1909 served as a member of the commission appointed by Governor Hughes to revise the city charter. He has been identified for many years with the public affairs of the Bronx.

Mr. Metz was City Comptroller during much of the early period of subway building. Although now a resident of Manhattan he has continued to serve as chairman of the transit committee of the Brooklyn Chamber of Commerce and is thoroughly conversant with the city's transit affairs. An abstract of the address on transit in New York which he made on April 12, 1921, before the New York Electrical League was published in the ELECTRIC RAILWAY JOURNAL for April 30, 1921, page 811.

Representation of the public in the Interborough board is one of the many concessions required by the Transit Commission as a consideration for its approval of the Interborough plan of readjustment developed during the summer and fall. This plan, which was submitted to the security holders of the Interborough and Manhattan companies under date of May I becomes fully effective with the present reorganization of the board. Under the provisions of the voting trust agreement, executed in pursuance of the plan the number of directors was increased from fifteen to eighteen in order to permit the inclusion of the representatives of the public and an amendment to the by-laws was also adopted providing that the three

additional directors need not be stock-holders.

Under the voting trust agreement the Transit Commission was authorized to determine whether the public representatives should be chosen by the commission itself, by the city government or by the two acting in conjunction. In making its announcement, the commission, however, stated that as the city government, through the Corporation Counsel, has been attacking the reorganization plan itself and has apparently no sympathy with its purposes, the selection of the first representatives by the commission alone seemed to it the appropriate method. Legislation will be asked requiring that the members representing the public to be chosen next year and subsequently shall be appointed by the Board of Estimate.

W. J. Bertke Vice-president and Manager at Sioux City

W. J. Bertke, until recently manager of the Sioux City Gas & Electric Company, was elected vice-president and general manager of that company and the Sioux City Service Company following its acquirement on Nov. 2 by interests identified with the United Gas Improvement Company, Philadelphia, Pa. Mr. Bertke has been connected with various properties controlled by the United Gas Improvement Company since his graduation from the University of Wisconsin in 1903. At that time he enrolled in the cadet course being conducted by this company on its property in Sioux City. After two years in this course he was transferred to the Wyandotte County Gas Company in Kansas as assistant superintendent and two years later he returned to Sioux City as superintendent of production. A year later he was transferred to the distribution end of the business and two years later he took charge of both production and distribution.

Mr. Bertke became assistant general manager of the Sioux City Gas & Electric Company in 1917, the position he held until his recent advancement. Mr. Bertke's recent promotion presents to him for the first time problems of electric railway management, but in handling these he will be able to call on H. L. Kirk, formerly manager of the company, who was made president, also as a result of the combination of the two companies under one management.

Mr. Anger Heads Car Meter Department

Edward W. Anger has been appointed superintendent of the newly-established car meter division of the Chicago Surface Lines in charge of the records of operation of Economy car meters, to be installed on all of the company's cars, also the preparation of studies and reports thereon. This new division will consist of about fourteen persons. Mr. Anger has been with the company about twenty-five years mostly in the engineering department.

Messrs. Insull, Budd and Jones Interested in Utility Courses

Martin J. Insull, president of the Middle West Utilities Company, Chicago, Ill., recently addressed freshmen and sophomores of the College of Com-merce of the university on "Training for the Utilities Business" and "Public Utilities Offer a Business Career." Mr. Insull accompanied a number of public utility men to the University of Illinois at Urbana to confer with faculty members and students of the College of Commerce in regard to courses offered preparatory to entering public utility service as a lifework. Proposals were discussed for such courses and the iniprovement of the public utilities curricula in the university. Besides Mr. Insull, Britton I. Budd, president of the Chicago Elevated Railways and the Chicago, North Shore & Milwaukee Railway, and George R. Jones, secretary-treasurer of the Northern Illinois Utilities Company, made the trip to Urbana.

The University of Illinois has for many years been especially strong in its offerings of courses in electrical engineering, electric railway engineering and steam railway engineering. The College of Commerce is now cooperating with the College of Engineering of the university in selecting courses which will fit men to enter the accounting and business ends of public utility

fields.

The visit of Messrs. Insull, Budd and Jones was made in appreciation of the work now being offered by the university, with an invitation being extended to these men of practical utility experience to suggest changes or improvements in the work now undertaken.

The three visitors are said to have pledged their support and aid in making the courses more valuable to prospective public utility men of the next business generation.

Wray Thorn Joins Garford Truck Organization

Wray T. Thorn, assistant engineer of cars and equipment Board of Supervising Engineers, Chicago Traction, has become connected with the Garford Motor Truck Company, Lima, Ohio. Since his graduation from Purdue in 1903 a great deal of Mr. Thorn's work has had to do with the development of the design of electric railway cars and it is the knowledge thus gained and his acquaintance with transportation problems that he will be able to bring to bear upon the work of the Garford Company, Mr. Thorn served the Chicago board for more than ten years and during this period acted as a general consultant in the design of new passenger equipment, his most important work along these lines being for the Kansas City Railways. He was a member for two years of the committee on equipment of the American Electric Railway Engineering Association. Mr. Thorn was the author of a series of articles on the development of Chicago's street cars published in the issues of this paper for Sept. 23 and 30, 1922.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions A Department Open to Railways and Manufacturers for Discussion of Manufacturing and Sales Matters

Board Witholds Censure

Coal Commission Is Unwilling to Express Its Conclusions Until All Facts Are Weighed

In its effort to be absolutely fair and to avoid placing responsibility before the blame is proved, the President's Coal Commission has brought out a report which is certain to be a disappointment to the consumers of coal and to many members of Congress. In the coal trade itself there is a very evident sense of relief. In the average investigation of this kind it is customary to have some harsh things to say to operators, wholesalers and retailers, even before it has been established that they are guilty.

The Jan. 15 report has all the indications of a desire to avoid expressing conclusions until all the facts can be weighed. As a consequence, it may be predicted that the smaller consumers and a certain element in Congress will feel that the report is colorless and that the commission is not reaching the seat of the trouble. It does not express an opinion as to whether or not current' prices are just. It does not say whether or not the miners are receiving a higher rate of wages than the consumers should be called upon to pay. No one is accused of profiteering. The report indicates in a general way something as to the spread between the cost at the mine and the delivery cost of coal. but it gives no clue as to who is responsible. Labor, transportation, overdevelopment, storage and other matters are discussed, but little is said about the business factors in coal. For that reason it is certain that some of the gentlemen on Capitol Hill will conclude that the commission has written "Hamlet" with Hamlet left out.

COMMISSION PURPOSELY DELIBERATE

The more constructive thinkers both within and without the industry seem to be agreed that the commission did well in making haste slowly. Even those who are expressing much disappointment with the report are inclined to suspend final judgment as to the possibility of the commission bringing out something concrete at a later date.

A careful analysis of the report shows that there is little material in it which could not have been written on the first day that the commission sat. Nevertheless the presentation of this material is regarded as very valuable because the wide publicity will contribute greatly to the popular understanding of the entire subject. The report must be regarded more as a statement of the problems of the commission rather than a contribution to

their solution. Not one shred of new statistical information is contained in the document. From a constructive point of view, this failure is regarded as the most serious because the report as it stands holds out no assistance to the New York conference. An unusual opportunity was offered to get material of a statistical character before that body, but this seems to have been made impossible by the mixup over the cost forms.

A significant feature of the report is the indication that the commission is not inclined to allow the coal industry to blame all of its ills on the transportation systems.

Commonwealth Edison Buys Parsons Turbine

A 40,000-kw. Parsons turbo-generator has been purchased by the Commonwealth Edison Company for use in the new Crawford Avenue station in Chicago. The set ordered from C. A. Parsons & Company, Newcastle-on-Tyne, will operate at a throttle pressure of 550 lb. with a total steam temperature of 725 deg. F., and after passing through the high pressure end of the turbine the steam will be reheated to the initial temperature. The turbine will be used in the new plant along with other turbines which will be mainly of American manufacture. The station is designed to have an ultimate capacity of 500,000 kw. This is the second turbogenerator of the Parsons manufacture that the Commonwealth Edison Company has purchased, the first being a 25,000-kw. set secured in 1912 and installed in the Fisk Street station, from which satisfactory operation has been secured. Sargent & Lundy of Chicago are engineers in charge of the design with Merz & McLellan, London, acting as advisory engineers.

President Herr Sees Bright Prospects Ahead

E. M. Herr, president of the Westinghouse Electric & Manufacturing Company, says that activity in the electrical industry in 1922 was not of such large proportions as seriously to embarrass the companies supplying electrical energy, but that it was great enough to call for extensions to many plants and to make evident to many more that their reserve capacity is gone. The extensions already made to existing power plants have been so limited to immediate needs that in several instances, even before the new apparatus has been completely installed, additional orders for greater capacity had to be placed. This, together with the increasing interest in railway electrification, gives promise of an active demand for electrical products during 1923

As Mr. Herr sees it the needs of the world are so great that in spite of the halt in liquidation of war-time wages and prices it is probable a large volume of business will be done during the coming year. This should be especially true of the electrical manufacturing business, the uses for whose product are developing rapidly and should continue to do so for some time to come.

The development of higher voltages in electric power transmission and the collateral development of means of control and interconnection of such transmission lines into so-called "superpower zones" give promise of great economic results in this extremely important field.

Mexican Electrification in Prospect

Alfred Crewdson of Manchester, England, and British associates who own the Coahuila & Zacatecas Railroad are making preparations to electrify that line which runs between Saltillo, Mexico, and the mining town of Concepcion del Oro, 78 miles, with a branch line from San Pedro to Avalos, 17 miles. The railroad was built some years ago, primarily to serve the Mazapil Copper Company, Ltd., which is owned by the same interests. This company owns copper mines at Concepcion del Oro and Mazapil, and operates a smelter at the former place and another one at Saltillo. The railroad is of 3-ft. gage. Stephan Phindler, electrical engineer for the Mazapil Copper Company, Ltd., is now making the surveys and estimates for the proposed electrical installation.

The project involves the building of a dam and water storage reservoir and the erection of a hydro-electric plant. The advisability of changing the gage of the line to standard width and extending it through the State of Zacatecas is being considered. The road now connects with the National Railways of Mexico at Saltillo, but there is no interchange of cars because of the difference in gages of the two lines. R. H. Jeffrey is vice-president and general manager of the railroad at Saltillo.

Metal, Coal and Material Prices

Metal, Coal and Material 1	Tices
Metals-New York Jan.	16, 1923
Copper, electrolytic, cents per lb	14,625 16.75 7.60 7.07 38.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$8.75 5.125 3.375 2.70 2.125 2.50
Linseed oil (5-bbl.lots), N.Y., cents per gsl. White lead (100-lb.keg), N.Y., cents per lb.	6.35 16.50 \$2.05 93.00 12.625 \$1.55

Rolling Stock

Beaver Valley Traction Company, New Brighton, Pa., expects to buy some new passenger cars in the near future.

Lima (Ohio) City Railway expects to have five new one-man cars in service by Feb. 1. Fifteen more cars will be placed in service during the rest of the year.

Indiana Service Corporation, Fort Wayne, Ind., has placed in commission six of the lifteen new cars ordered several months ago for use on city lines in Fort Wayne, Ind. The remaining nine cars will be added as they are received from the shops.

Interstate Public Service Company, Indianapolis, Ind., expects to purchase three combination dining and chair cars within the next few weeks. Each ear will be equipped with two motors for multiple-unit operation in trains.

Louisville (Ky.) Railway lost fourteen double-truck cars, fifteen singletruck cars and six trailers in a fire late on Jan. 15, which partly destroyed its Fourth Street carhouse. President Barnes estimates the loss at \$350,000. Other details about the fire are contained in an item elsewhere in this issue.

Signal Equipment

Morris County Traction Company, Morristowo, N. J., is arranging to install an automatic block signal system on its lines which run from Lake Hopatcong to Maplewood and Elizabeth.

The Philadelphia & West Chester Traction Company, Upper Darhy, Pa., has recently completed plans for increasing the terminal facilities at their Sixty-ninth Street Terminal, Philadelphia, Pa., where passengers are transferred to the lines of the Philadelphia Rapid Transit Company. Three new station tracks are being added, making a total of eight. The rearrangement of the yard involves the addition of thirty-five new switches, making a total of fifty-six, and ten new signals, making a total of twenty-seven. The interlocking plant will be electra-pneumatic employing color light signals. Alternating current is being used throughout for the forty-six track circuits as well as for the control and indication of the switches and signals. The machine will have fifty-five working levers in a seventy-nine lever frame. All interlocking apparatus is being furnished and installed by the Union Switch & Signal Company,

Track and Roadway

North Carolina Public Service Company, Greensboro, N. C., is placing steel cross-ties mounted in a base of concrete to support the rails on West Lee Street, The company is repaying that portion of West Lee Street which lies between the rails of the car track and a distance car and locomotive axles, foundation of 18 in, outside each rail.

South Covington & Cincinnati (Ohio) Street Railway plans to spend \$300,000 this year in laying new tracks on various thoroughfares in Covington, Latonia and Ludlow, Ky. This announcement was made by W. II. Harton, general manager of the traction company, at a meeting of the Covington Board of City Commissioners. Mr. Harton also said that the traction company would start to lay new rails on Main Street in Covington and on DeCoursey Avenue in Latonia as soon as the weather permitted.

Power Houses, Shops and Buildings

Petomac Public Service Company, Frederick, Md., is making rapid progress in the erection of the \$2,000,000 electric power plant which is being built along the Potomac River at Williamsport, Md.

Boston (Mass.) Elevated Railway is roofing in the large new storehouse near the Charlestown line at Sullivan Square, Somerville, Mass. It is hoped the structure will be ready for occupancy in the early spring. The building is three stories high, 120 x 40 ft., of reinforced concrete and fireproof construction.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has been granted permission by the City Council at Brazil, Ind., to run a high-tension line along two streets in that city, to connect the substation there with the Indianapolis high-tension line. At present Brazil obtains electric current from the station at Terre Haute and in ease of a break in the line from that station the city is without lights or power.

Trade Notes

Consolidated Car-Heating Company, Albany, N. Y., has transferred L. S. Belding from the engineering department in Albany, to the sales department in Chicago, where he is under the direction of J. A. Robinson, general sales agent.

Stewart-Thill Company is the new name of the Walter L. Flower Company of St. Louis, district representatives of the Conveyors Corporation of America, Chicago. The personnel of the organization remains the same and offices will be continued at 312 Eighth Street, St. Louis, Mo.

National Railway Appliance Company, New York, N. Y., announces its appointment as agent for the Pittsburgh (Pa.) Forge & Iron Company for the States of New York and New Jersey and will be glad to give prompt and careful attention to all inquiries for the products of the latter company, which embrace bar iron, splice bars, track bolts, machine bolts, iron and stee!

car and locomotive axles, foundation bolts, arch bars, screw spikes, bridge bolts, plain and upset ends, links and pins, erank pins and tie plates.

Hardwood Manufacturers' Institute, Memphis, Tenn., has announced the appointment of Roy H. Jones as assistant to J. M. Pritchard, secretary-manager. During the war Mr. Jones was in Washington as manager of the Hardwood Emergency Bureau representing the lumber interests of Wisconsin and Michigan.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has announced the appointment of C. G. Taylor as director of purchases. He will have general supervision of the purchasing activities of all plants. C. G. Bunnell has been appointed purchasing agent of the East Pittsburgh Works to succeed Mr. Taylor.

E. C. Brandt, works manager of the Westinghouse-Krantz Works, has been appointed works manager of the new plant now being erected by the Westinghouse Electric & Manufacturing Company in Homewood, Pittsburgh. Mr. Brandt in 1905 entered upon the mechanical training course of the Westinghouse Electric Company and in 1907 began work for the company as a general mechanic and small tool designer. Since then he has held a number of important positions. He is a member of the Western Pennsylvania engineering Society and has written articles for engineering magazines and delivered a number of papers before engineering. societies.

New Advertising Literature

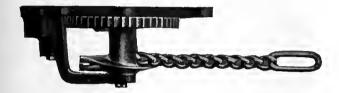
General Electric Company, Schenectady, N. Y., has issued No. 1 of a series of messages designed to supply information on the products which it manufactures and to the sc entific research back of their development. The first tells about Edison and National Mazda lamps.

Ohio Brass Company, Mansfield, Ohio has published a de luxe pamphlet (catalog No. 210) entitled "Imperial Headlights for Electric Railways. The booklet containing 252 pages with illustrations describes in detail the Crouse-Hinds luminous arc, carbon arc and incandescent for use in electric railway service.

The Dayton Air Brush Company, Dayton, Ohio, has issued a twenty-page illustrated catalog describing the Dayton air brush—what it is, what it does and why the manufacturer should have this equipment. The pamphlet contains a reprint of several letters written to the company which tell of the satisfaction these brushes give. The Dayton brush, according to the pamphlet, is for universal use and can be used for spraying and flowing all kinds of paints, enamels, varnish, shellac, kalsomine, disinfectants, gasoline, oils and all liquids for all purposes.

The Eccentric Drum and the Automatic Stop





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In place of the slow-winding spindle the Peacock Improved Brake employs the eccentric drum principle. At the start of braking, when least pressure is required, the chain winds rapidly on the largest radius of the eccentric. By the time that maximum braking power is required, the chain is being wound on the smallest part of the eccentric. This speed is secured while pressure is not needed, and pressure is secured when speed is not needed. This combination means that Peacock Improved Brakes are powerful and fast.

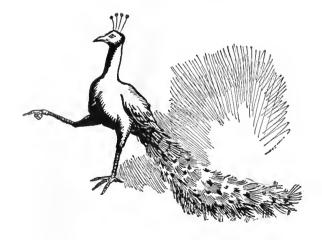
The Automatic Stop feature adds to certainty of quick application, by preventing excessive unwinding of chain on release. It saves at least one full turn of the hand wheel on the next application.

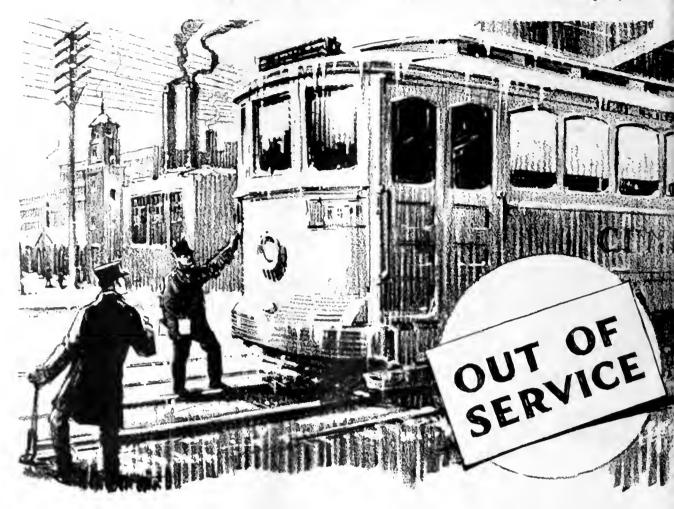
Ample chain-winding capacity on the large open drum, prevents any possibility of sticking or jamming before the maximum braking power has been applied.

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Rolling Stock that doesn't Roll

How to cut your loss of car hours

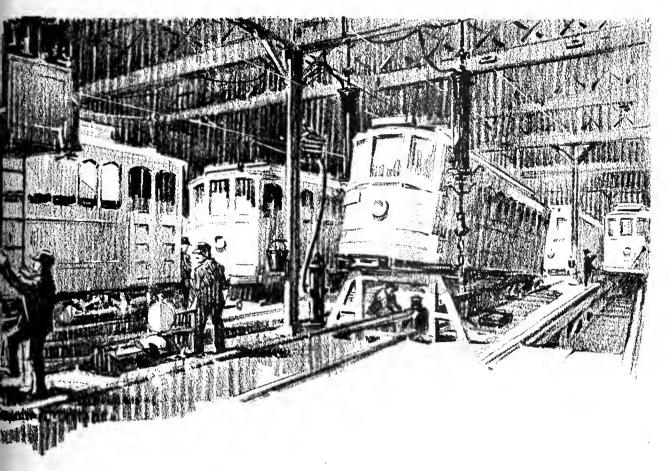
YOUR LOSS of car hours tells a story.

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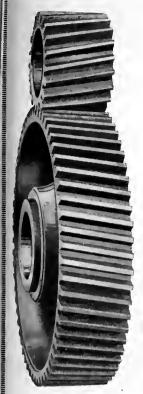
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Instead of a big coarse-threaded jam nut that needs a two-fisted wrench for application you require only a pocket-size wrench that is applied at a convenient angle. The secret? The jam-nut idea is replaced by a split clamp with a spring power that won't be loosened once the little nut on the side has been tightened.

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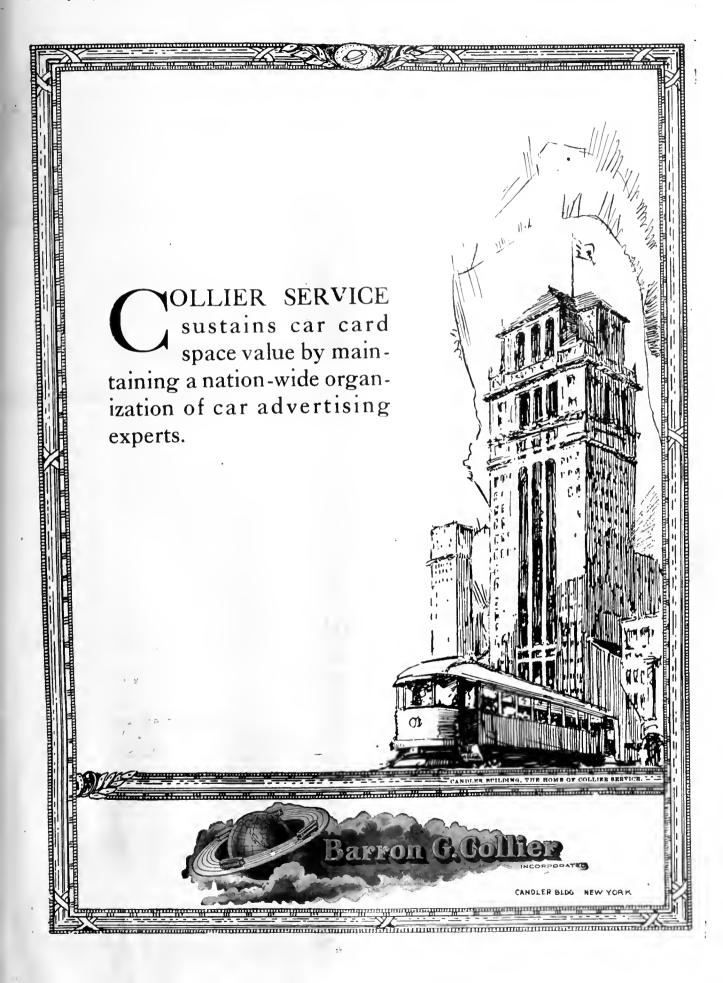
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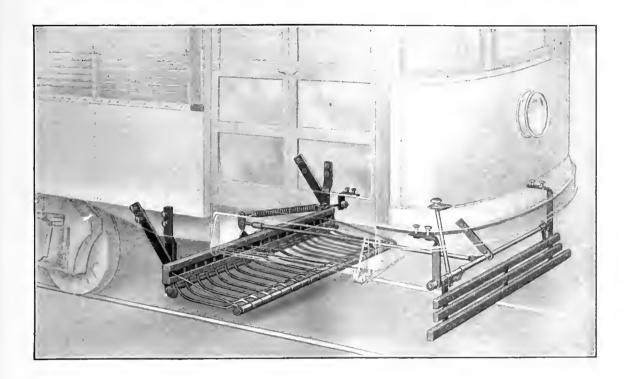
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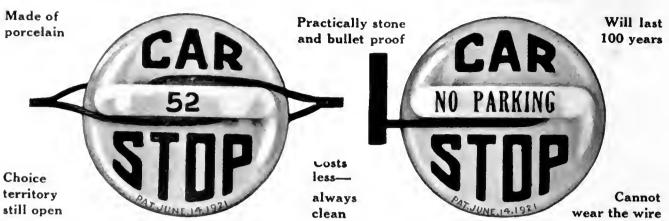
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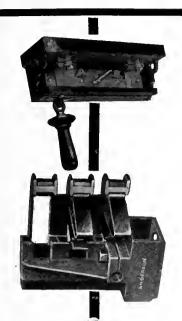
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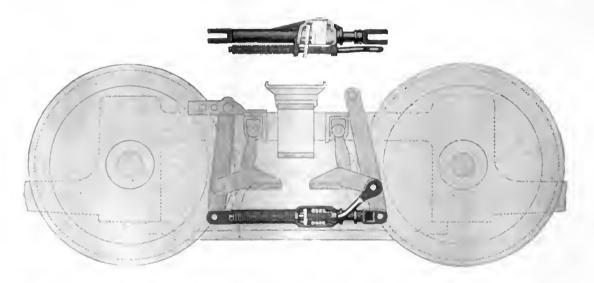
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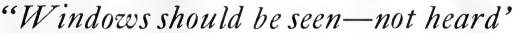
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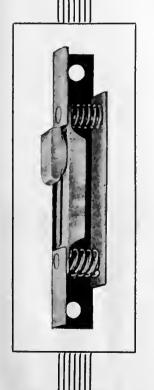
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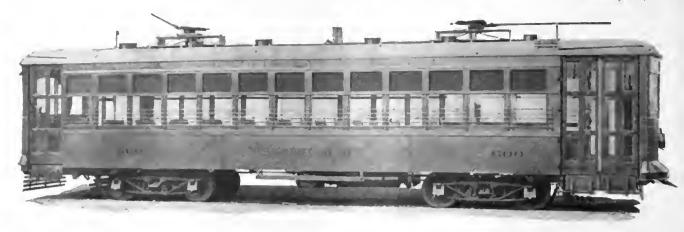
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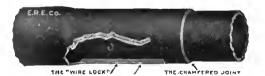
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The handle and holder last—the wearing part is easily refilled at trifling expense. It is the only refillable track broom in the market. Refills made of best tempered round steel wire. Heads treated with special anti-rust process.

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COMPLETE LAYOUTS
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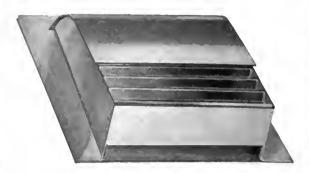
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N-L Products manufactured and sold in Canada by Railway and Power Engineering Corporation, Ltd., 133 Eastern Avenue, Toronto, Ontario

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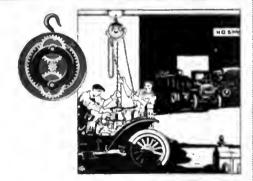
Concrete Trolley Poles

West ALLIS, Wis., has recently put in service an ornamental street lighting installation in which the standards are made strong enough to support the trolley wires. This and other types of Hollowspun reinforced concrete poles are described in Catalog Supplement No. 9.

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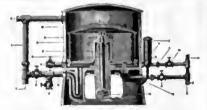
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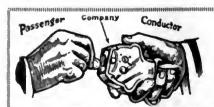
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0220

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have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be mislead by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN WORLD



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Grade 203, produced by research and proved by test, the most satisfactory and lowest cost-per-cae-mile brush obtainable for A. C. commutator type railway motors. One of a series of standard railway motor brushes.

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COST NO MORE — LAST LONGER

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Gets Every Fare PEREY TURNSTILES or PASSIMETERS

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E. R. J.

POSITIONS VACANT

DRAFTSMAN wanted by a manufacturer of special track work in the East. Must be thoroughly familiar with designing and detailing both steam and street constructions. P-501, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

MAN not over 30, Protestant, with experience in accounting to assist auditor of public utility having annual gross of one million, location New England, state experience, salary, when available, replies confidential. Address P-502, Electric Rallway Journal, 10th Ave. at 36th St., New York City.

POSITIONS WANTED

AUDITOR or assistant. Twenty years' experience in electric railway, light and power. At present employed, but desire to make a change. PW-507, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.



2004

iliGH grade master mechanic, employed, desires change. 22½ years' experience. Live wire. Can produce results. PW-509, Elec. Ry. Journal, Old Colony Bldg., Chicago. Ill.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campaigns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-499, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

MASTER mechanic desires position on small city or interurban property. I am at present employed and can give good references. PW-506, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

FOR SALE

20—Peter Witt Cars Weight Complete, 33,000 lbs.

Seat 53, 4-G. E. No. 258-C Motors K-12-H Control, West. Air Taylor Trucks R.H. Type. Complete.

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SUPERINTENDENT of equipment. There are roads where the equipment man too often criticises the other departments. There are others where he quietly shoulders as part of his job the extra work caused by poor track or rough crews. An equipment man of the latter type with a broad experience in street and interurban railway maintenance would like to place his application before managers who require a superintendent of equipment. Age, middle thirties. PW-505, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

TRAFFIC supervisor or chief clerk by young man with twelve years' experience as trainman, inspector, schedule and chief clerk. PW-503, Electric Railway Journal, Leader-News Bldg., Cleveland,

FOR SALE

12—GE 247 40 HP Motors

TRANSIT EQUIPMENT COMPANY 501 Fifth Avenue, New York,

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is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are you using the Searchlight Section?

0318

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car Collier, Inc., Barron G. Air Receivers & Aftercuolers Ingersoil-Rand Co. Anchors, Guy
Elec, Service Supplies Co.
Ohio Brass Co.
Drew Elec, & Mfg. Co.
Westinghouse E. & M. Co Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co. Automatic Return Switch Stands Results
Stands Ajax Corp. Automatic Safety Switch Stands Ramapo Ajax Corp. Asles
Bemis Car Truck Co.
Axle Straighteners
Columbia M. W. & M. I. Co. Columbia M. W. & M. I. Co Axies, Car Wheel Bemis Car Truck Co. Brill Co., Tho J. G. Carneste Steel Co. Westinghouse E. & M. Co. Babbitt Metal Ajax Metal Co. More-Jones B. & M. Co.

MOTO-JONES D. & M. CO.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Sup. Co.
lut. Register Co., The Batteries, Dry National Carbon Co.

Bearings and Bearing Metals Alax Metal Co. tearings and Bearing Metala Ajax Metal Co. Bemis Car Truck Co. Columbia M. W. & M. 1. Co. Brew Eiser. & Mfg. Co. General Electric Co. Gilbert & Sons B. F. Co., A. Le Grand, Nic More-Jones Br. & Metal Co. Westinghouse E. & M. Co.

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Stucki Co., A
Bearings, Roller
Stafford Roller Bearing Car
Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
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Bollers
Babcock & Wilcox Co.
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Amer, Steel & Wire Co.
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Bonding Apparatos
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Indianapolis Switch & Frog

Co. Ohlo Brase Co. Railway Track-Work Co. Rail Welding & Bonding Co.

Rail weiging a sonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
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General Electric Co.
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(See slao Poles, Tles,
Posts, Etc.)

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Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
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Brake Shoes

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Bruke Br. Shoe & Edy, Co.
Barbour-Stock well Co.
Berils Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.

Columbia M. W. & M. I. Co. Brakes, Brake Systems and Brake Ports Allie-Chalmers Mtg. Co. Brill Co., The J. G. Columbia M. W. & M. I. Co. Safety Car Devices Co., General Electric Co., National Brake Co.

Safety Car Devices Co. Westinghouse Tr. Br. Co. Brooms, Brushrs, Etc. Worcester Brush & Scraper Co.

Brooms, Truck, Steel and Rattan Amer. Rattan & Reed Mfg. Co. Worcester Brush & Scraper

Co.

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General Electric Co.
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Brushes, Wire, Pneumatic
Ingersoil:Rand Co.
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Anderson Mig. Co., A. &
J. M.
Columbia M. W. & M. I. Co.

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Nac'l Fibre & Insulation Co.
Bushings, Case Hardened and
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Mica Insulator Co.
Carbon Brushes (See Brostoe)

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Wason Mig. Co.
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Earll, Chas. I.
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Ohio Brase Co.
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Coal ad Ash Handling (See
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Mica Insulator Co.
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Indianapolis Switch & Frog
Co.

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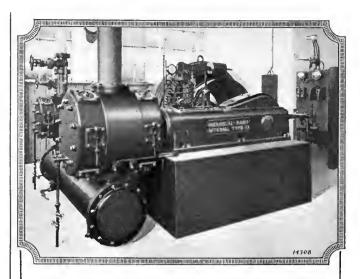
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ALPHABETICAL INDEX TO ADVERTISEMENTS

Page Ajax Metal Co 55 Allis-Chaimers Mfg Co 47 Allison & Co. J. E 27 Amer. Brake Shoe & Fdy. Co. 40 American Car Co. 57 American Electrical Works. 43 American Insulating Machinery Co. 47 Amer. Mason Safety Tread Co. 56 American Porcelain Co. 38 American Rattan & Reed Mfg Co. 49 American Rattan & Reed Mfg Co. 49	Page	Page Page 26 Jeakson, Walter 26 Jeandron, W. J. 55 Johnson Fare Box Co. 48 Kuhiman Car Co. 57 Le Carbone Co. 55 Le Grand, Inc. Nic. 49	Page Railway Track-work Co. 13 Railway Utility Co. 56 Rail Welding & Bonding Co. 16 Ramapo Alax Corp. 45 Richey, Albert S. 26 Robinson & Co., Dwighl P. 27 Roebling's Sona Co., John A. 44 Rome Wire Co. 44 Rooke Automatic Register Co. 48
American Steel & Wire Co. 45 Anaconda Copper Mining Co. 44 Anderson Mfg. Co. A & J. M. 30 Archbold-Brady Co. 44 Arnold Co. The. 2d Babcock & Wilcox Co. 45 Barbour-Stockwell Co. 45	Electric Railway Equipment Co. 43 Electric Service Supplies Co.	McCardell & Co	Safety Car Devices Co. 6 St. Louis Car Co. 42 Samson Cordage Works. 49 Sanderson & Porter 26 Searchlight Section 51 Smith & Co. C. 26 Smith Heater Co. Peter. 48 Stafford Roller Bearing Car Truck Corp. 49
Bates Expanded Steel Truss Co. 12 Bayonet Trolley Harp Co. 55 Beckwith-Chandler Co. 17 Beeler, John A. 26 Bemis Car Truck Co. 28 Bonney Vehslage Tool Co. 48 Brill Co. The J G. 57 Buckeye Jack Mfg. Co. 45	Galena-Signal Oil Co. 21 General Electric Co. 22, Back Cover Gilbert & Sons, A. 50 Go'd Car Heating & Ltg. Co. 50 Gould Coupler Co. 40 "Help Wanted" Ads. 51	Nachod Signal Co., Inc	Standard Underground Cable Co. 44
Burry Railway Supply Co. 50 Cameron Electric Mfg Co. 47 Carnegie Steel Co. 45 Chillingworth Mfg Co. 40 Cleveland Fare Box Co. 56	Hemingray Glass Cn. 43 Hemphill & Wells. 26 Heywood-Wakefield Co. 48 Ho'st. Englehardt W. 26 Hubbard & Co. 44	National Railway Appliance Co. 50 New York Switch & Crossing Co. 45 Nichols-Lintern Co. 46 Nuttall Co., R. D. 27	Transit Equip. Co
Collier, Inc. Barron G	Indianapolis Switch & Frog Co	Ohmer Fare Register Co	Want' Ads. 51 Wason Mfg. Co. 57 Westinghouse Electric & Mfg. Co. 2, 4 Westinghouse Traction Brake Co. 5 Wharton, Jr., Co., Wm. 44 White Engineering Corp. J. G. 26 Wish Service, The P. Edw. 56
Dayton Air Brush Co	Irvington Varnish & Insulator Co	Positions Wanted & Vacant 51	Wood Co., Chas. N



Any width, with or without not MASON SAFETY TREAD for car and station steps Standard for 15 years

American Mason Safety Tread Co., Lowell, Mass.

Stanwood Steps and Karbolith Flooring
Branch offices in New York and Philiadelphia
Joseph T. Rystion & Son, Chicago, Western Distributers







METER THE ENERGY that's what you want to save

Then double the saving by inspecting cars on a kilowati-hour basis instead of mileage or time-basis. Ask for data ECONOMY ELECTRIC DEVICES COMPANY

L. E. Gould, 37 W. Van Buren St., Chicago GENERAL AGENT: Lind Aluminum Field Coils DISTRICT AGENTS: Pater Smith Reaters, Woods Lock Till Fare Boses, Bemis Truck Specialties, Millsr Trolley Shows.

SAILWAY UTILIT OMPANI

'HONEVCOMB" AND "ROUND JET" VENTILATORS
Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THEEMOMETER CONTROL

of Car Temperatures.

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Write for Catalogue

1328 Broadway New York, N. Y.

Fare Boxes Change Carriers

COIN COUNTERS SORTERS

WRAPPERS

THE CLEVELAND FARE BOX CO. CLEVELAND, OHIO

Canadian Branch, Preston, Ontario.

will locate the

THE SEARCHLIGHT SECTION

Man you want Position you want Equipment you want

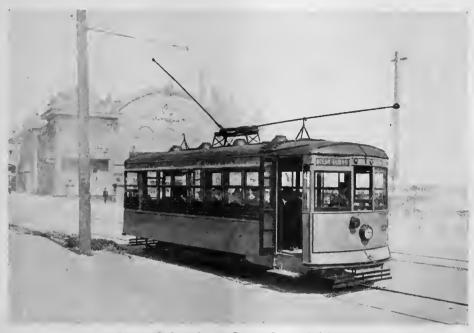
Are you using the Searchlight?

THE P. EDWARD WISH SERVICE

50 Church St. Street Railway Inspection
DETECTIVES **NEW YORK**

131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electrical Railway Journal would be appreciated.



Birney Safety Car at Santa Cruz, California

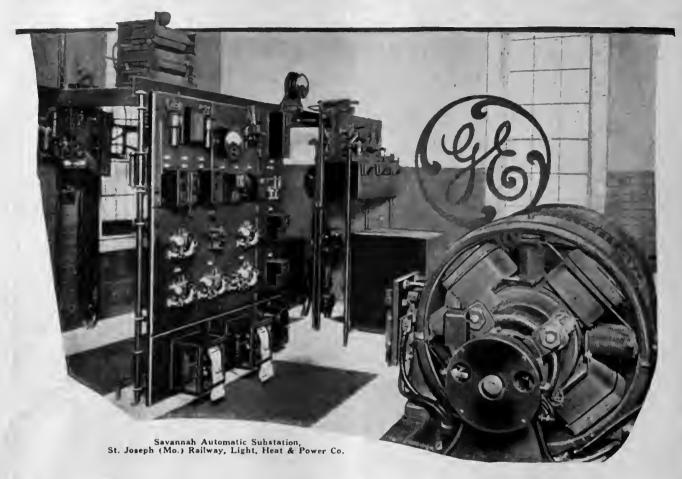
The First Light-Weight Car

Today there are over 3600 Birney Safety Cars built by us in service in over 200 cities, and these represent many railways which have standardized on this type car.

The Birney Safety Car was not only the first light-weight car to be generally adopted, but it is the lightest weight car on the basis of its seated passenger load ever developed. Consequently, its most economical operating cost and low maintenance has proved attractive to railway officials interested in stimulating their business by more frequent service.



Automatic substations will effect greater economies



No hands, yet they serve

Significantly indicating the trend of the times is the increasing application of automatic control to electric railway distribution systems.

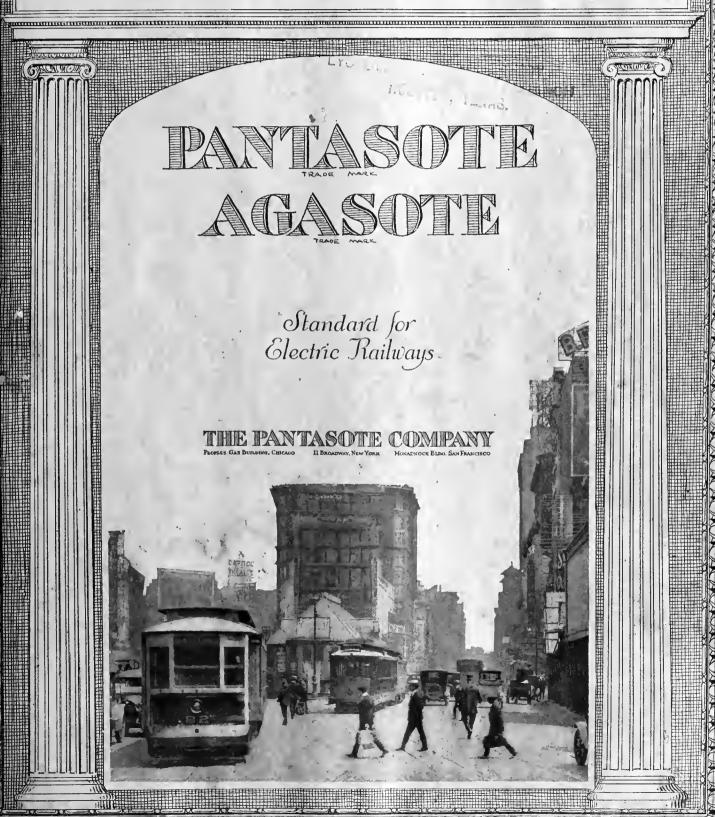
Automatic railway substations have proved themselves in service. They are being preferred by many properties in the interest of greater economy and better schedules. Automatic apparatus—responding to power demands—insures a power supply which is adequate to meet traffic requirements.

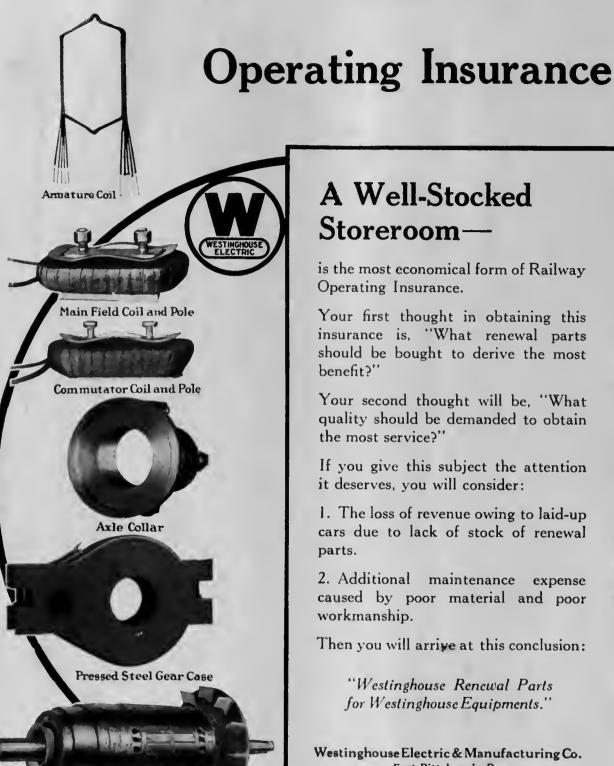


There are now 165 G-E automatic control equipments for railway substations in operation or on order. This makes a total of nearly 130,000 kw. capacity, established since 1914 when the first automatic equipment was furnished.









Complete Armature with Fan

A Well-Stocked Storeroom-

is the most economical form of Railway Operating Insurance.

Your first thought in obtaining this insurance is, "What renewal parts should be bought to derive the most benefit?"

Your second thought will be, "What quality should be demanded to obtain the most service?"

If you give this subject the attention it deserves, you will consider:

- 1. The loss of revenue owing to laid-up cars due to lack of stock of renewal
- 2. Additional maintenance expense caused by poor material and poor workmanship.

Then you will arrive at this conclusion:

"Westinghouse Renewal Parts for Westinghouse Equipments."

Westinghouse Electric & Manufacturing Co. East Pittsburgh, Pa.

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CONTENTS

Editorials
New York, London, Paris and Berlin Transit Compared 153
By Daniel L. Turner. This section of Mr. Turner's report compares operating conditions, such as fares, types of cars used, headways, etc., on the rapid transit and surface lines in the four jargest cities in the world.
An Amusement Park That Pays
Richmond Valuation Report
Association News and Discussions
C. E. R. A. Enjoys Louisville Hospitality
Railways Must Take Bold Action in Studying Their
Problems
BY CLINTON E. MORGAN.
One-Man Car Operating Figures from Youngstown,168 By Richard N. Graham.
The Use of the Interurban Bus
Marketing Your Own Commodities
Full and Semi-Automatic vs. Manual Operation for Substations
Emergency Stops
Automatic and Semi-Automatic Substations for Electric Railways
Lubricating Railway Motors
The Selling Principle of the Weekly Pass
American Association News
Maintenance of Equipment180
News of the Industry183

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Published weekly. Entered as second-class matter, June 23, 1908, at the Pest Office, at New York, under the Act of March 3, 1879. Printed in U. S. A.

Think of the Journal

What the Subscribers

IN PREVIOUS issues this column contained a few extracts from letters written to the editors expressing comment on the worth of the JOURNAL. Herewith are more comments from the subscribers.

The Most Welcome Weekly Visitor

It still remains, on the whole, the most welcome weekly visitor among all the trade papers that come to my desk.

-E. M. W., General Manager.

Wants Covers Pushed Farther Apart

I find the whole magazine interesting and I go through it from cover to cover, though my own railway interest is in the maintenance of way department. I can make no suggestions as to improvements unless it is that you try to scare up more dope to sort of push the covers farther apart, thus prolonging the "cover-to-cover" sport and deferring the second trip through.

-C. L. B., Engineer.

Would Be at Loss if Journal Did Not Come Regularly

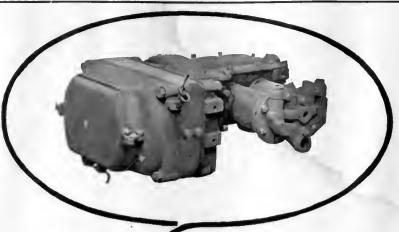
We consider the Electric Railway Journal one of the best trade journals which come to our office. We find that it is strictly up to date and has exceptionally fine articles, well written, many of them written in such a way that they are most interesting, and relating to all phases of the industry. Any street car official who wants to get the latest information in regard to his particular line of business can surely get many valuable pointers through the columns of your JOURNAL. We would be at a loss if the JOURNAL did not come to our desk regularly.

-S. H. M., Manager.

Always Has Been Best Periodical

My judgment is that the ELECTRIC RAILWAY JOURNAL is decidedly the best periodical that is published dealing with the street railway situation, and always has been. The news covers the field, and so far as I am able to see, meets the demands of the street railway officials and employees. —J. J. C., General Manager.

"The Bingalow — A Low Compressor of High Quality," is the tifle of an attractive new book-let which gives a com-plete, up-to-date descrip-tion of the Westinghouse DEL I was compressed.



The 8-inch Suction Strainer



DH "Bungalow" Compressors



Because they are low-height, light-weight, compact machines, built to save space and to give plenty of track clearance when installed under cars of the modern, low-built type.

That is one advantage. There are many others that you should know about; special features which assure high-class, dependable performance, long service and low maintenance expense.

DH compressors are furnished in three sizes—10. 16 and 25 cu. ft. capacity.

Westinghouse Traction Brake Company General Office and Works: Wilmerding, Pa.

Boston, Mass. Chicago, III. Columbus, O. Denver, Colo. Houston, Tex.

Washington Seattle San Francisco



ESTINGHOUSE TRACTION BRAKES

For a span make-up that protects your big investment



Most of your trolley line investment is in the wire and the labor of installing the wire. So, any fittings that prolong the life of the wire, or save labor, or that stay in service so long that maintenance is reduced, are assets of real value.

Each of the O-B Fittings illustrated here does at least one of those desirable things.

O-B XH Strain Insulator Made of high tension porcelain side by side with the insulators which carry the highest commercial voltages in the transmission field. A sturdy rugged insulator especially designed for railway strain work.



O-B Lock Hanger

Combines the virtues of the cap and cone and straight line hanger. Every ear fits tightly against O-B Lock Hanger.



O-B Type A Ear

This ear has an improved underrun which carries the wheel smoothly from wire to ear and back to wire. One company discovered that this ear increased wire life about 60% and the ear itself lasted fully as long as other ears.



O-B Type C Splicer

Wire enters without bending. O-B C Splicer is easy on the trolley wire and is particularly useful for keeping worn wire in service. O-B C has patented underrun which diminishes arcing and saves the wire.





New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Ineulators, Third Rail Insulators

Insurance plus Marsh & M-Bennan Service

Additions and Betterments

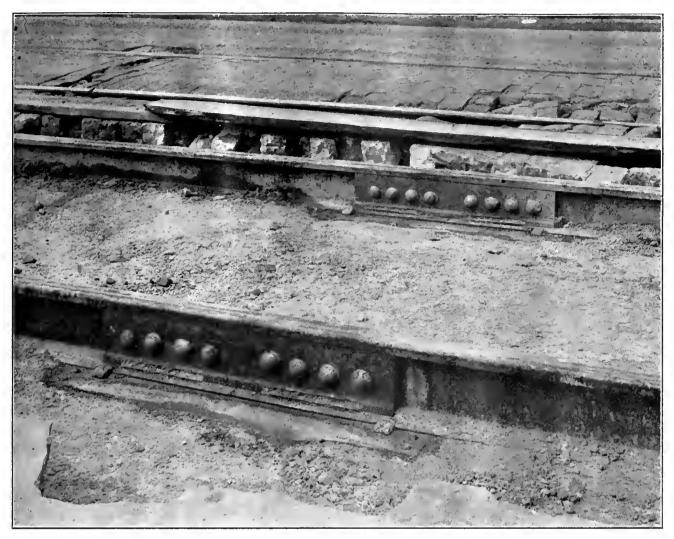
When plans are taking shape for additions and betterments, you can profitably employ the services of Marsh and McLennan engineers.

They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

Business executives of many of our large corporations have used this service profitably.

MARSH & MCLENNAN 175 W. Jackson Blvd. Chicago, Ill.

Minneapolis New York Detroit Denver Duluth Columbus San Francisco Seattle Cleveland Winnipeg Montreal London



There are 468 square inches of bearing in each plate of a steel twin tie.

THE TIE-PLATE IS PART OF THE TIE

To help increase the life of wood ties by preventing rail cutting, many Engineers favor tie-plates.

The principle involved has been extended and developed in STEEL TWIN TIES in which the tie-plate is part of the tie.

The plates provide a larger bearing

than is possible with wood ties on two-foot centers. They distribute the wheel loads on top of the concrete of the track foundation instead of at some point six to eight inches below the base of the rail. Hence there is more concrete in bearing with less total concrete required. The ultimate result is better track at a lower first cost.

THE INTERNATIONAL STEEL TIE COMPANY Cleveland, O.

Steel Twin Tie Track









Reciprocating Track Grinder

Universal

Rotary Track Grinder

the machine.

Diamond Brand Grinding Wheels

a good strong weld with AJAX

Electric Arc Welder

Its remarkably high ampere output enables the welding heat to burn deeply into the rail. When made with the Ajax, a weld is something more than a layer of new metal laved on old. It makes a truly unified, coherent job, which will not chip or break off. Three hundred and thirtythree amperes capacity at 600 volts—200 amperes at 300 volts. This is nearly 50% higher capacity than any other resistance machine on the market.

and a smooth run-off

ATLAS Rail Grinder

After the joint or piece of broken special work is built up by welding, use the Atlas Rail Grinder to remove the surplus metal and to grind down to a smooth run off on both sides of the joint. The long travel of the grinding wheel carriage enables the joint to be ground in without moving

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

Electrical Engineering & Mfg. Co. Pittsburgh

AGENTH: Atlas Railway Supply Co.

Equipment & Engineering Co.
London

North, East, South, West!



KEYSTONE

CAR SPECIALTIES

Illuminated Destination Signs Steel Gear Cases Motormen's Seats Faraday Car Signals Lighting Fixtures Golden Glow Headlights Headlight Resistances Air Sanders Trolley Catchers Shelby Trolley Poles Rotary Gongs

International Fare Registers Fare Register Fittings

Samson Cordage

Air Valves

Cord Connectors

Trailer Connectors

Automatic Door Signals

Standard Trolley Wheels

Check off your wants and send for respective data sheets today

You'll find ranking railways of the country specifying from this list

If we started in to enumerate the systems satisfactorily using one or more of the Keystone Car Specialties listed on this page, we'd have to mention nearly every electric railway line in the United States. universal approval of Keystone Specialties is very gratifying, but we hope to see our good friends standardizing on the complete line of Keystone Car Specialties.

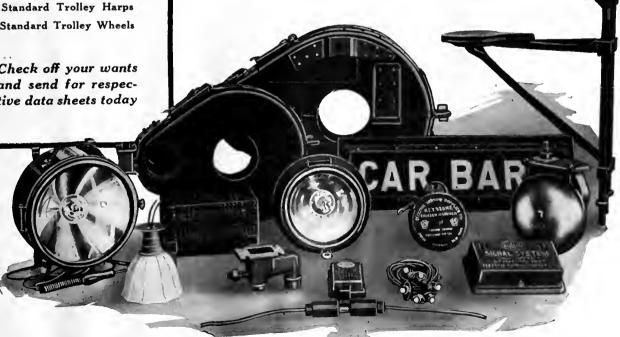
Maybe you haven't the entire file of Keystone data sheets. Shall we send them?

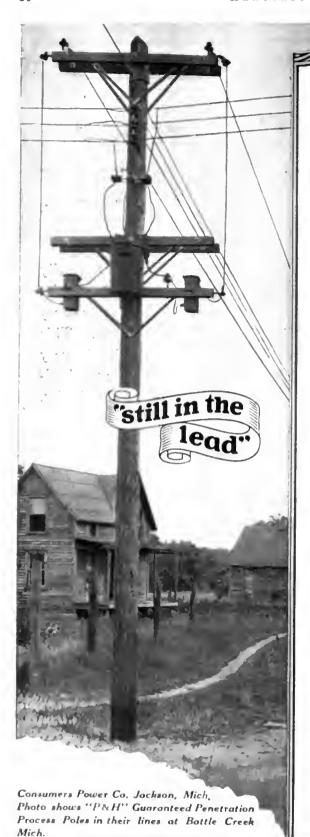
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Manufacturer of Railway Material and Electrical Supplies PHILADELPHIA **NEW YORK** CHICAGO 17th and Cambria Streets 50 Church Street Monadnock Bldg.

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Service!

Actual service in power, and telephone and telegraph lines in different parts of the nation. service under widely different climatic conditions, and in all kinds of weather and atmospheric conditions—that's the final and most important test of pole reliability and durability.

That's the kind of service you know you can expect from high grade cedar poles properly Butt-Treated.

The P&H" Guaranteed Penetration Process

guarantees in writing, a full one-half inch uniform penetration of the preservative throughout the ground-line area. The Butt-Treating price is refunded on any pole that does not test up to that definite specified result.

In this guaranteed one-half inch penetration, combined with the quality of the poles, you have the reason why "P & H" poles stand up better and last longer. It pays to insist on getting the genuine "P & H."

We produce and sell Butt-Treated and untreated Northern White and Western Red Cedar Poles;—we can give you any form of Butt-Treatment;—and we are the originators of the Cuaranteed Penetration Process—the "P & H."

Prompt Shipment—yards conveniently located throughout the North Central and Western States. Cet the facts about Butt Treatment. Write

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PAGE AND HILL CO.

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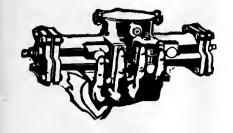
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Buffalo, N. Y. 950 Ellicott Sq. Bldg Louisville, Ky. 1416 Starks Bldg.

New York, N. Y. 50 Church St. Chicago, Ill., 19 Sr. LaSalie St.



A Hop, Skip and a Bump-

Then you settle the damages!

That's what's still happening too often in spite of safety first campaigns. The impatient rider won't wait for the car to stop, nor will he brook missing the starting one, if there is a possible opening for him to jump on. He hops out from the curb, skips nimbly through speeding traffic and swings for the open platform. Then comes the bump for which the company has to pay.

The all-enclosed platform with pneumaticallyoperated doors and interlocking signal system to the motorman is the best insurance against this kind of accident. No one is likely to jump at closed doors. If he does the evidence is all against him.

Many roads have practically eliminated the boarding and alighting class of accidents by this means.

You can do it too, by choosing suitable

NATIONAL PNEUMATIC EQUIPMENT

Door and Step Control

Motorman's Signal Lights

Multiple Unit Door Control

Monufactured in Canada by

Dominion Wheel & Foundries, Ltd.

Toronto, Ont.

National Pneumatic Company, Inc.

Originators and Manufacturers

PRINCIPAL OFFICE: 50 Church St., NEW YORK
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Works—Rahway, New Jersey

rust-resisting STRAND

the result of pure metal

WIRE corrodes on account of chemical and physical differences within the metal.

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.

The extra galvanized coating on Page-Armco Strand combined with the purety of the wire insures maximum service.

Page-Armco Iron Strand is used as messenger strand, guy wire or strand, telephone wire or strand, trolley span wire, ground wire or strand, telegraph wire, and as power transmission conductors.



Page Steel and Wire Company

Bridgeport, Conn.
District Sales Offices:

District Sales Offices:
Pittsburgh Port'and, Ore.



San Francisco



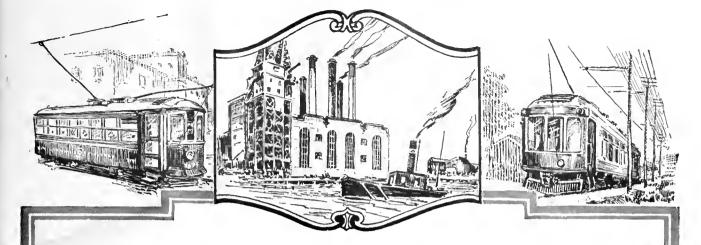
Rods—Armco Ingot Iron and Special Analysis Steels.

Wire—Plain and Galvanized — Spring, Rope, Telephone, Telegraph, Bond, Strand, Oxyacetylene and Electric Welding Wire.

Fence—Woven Wire for Farm and Railway Right of Way, Wire Link Protection for industrial Plants, Lawns, Schools and Estates, and Factory Partitions.



PAGE-ARMCO INGOT IRON GALVANIZED STRAND



Suppose your road were to buy an Aeroplane a Steamboat, or a Dredge

Far fetched? But suppose they did. And you had the job maintaining them. You'd have a new set of mechanical problems to work out.

But there's one problem that need not worry you at all, an important one, too. And that is the question of the kind and amount of lubricants to use.

You and the next man have only to call on The Texas Company, tell us what you have to lubricate, and we'll supply you with the right oils—promptly.

We can do it—because we are doing it. We are doing it in every industry, on every kind of machine under every conceivable working condition.

But to stick to the Street Railways—We like Street Railways, they offer us such a fine opportunity to illustrate our versatility.

You, Street Railway Men, can call on Texaco for the proper lubricant for every piece of equipment, all down the line.

Thus, we have time-tested lubricants for all the prime movers and auxiliaries in the power plant and substations; and on the cars we can take care of you completely with Texaco Car Oils, Texaco Compressor Oils, Texaco Gear and Pinion Lubricants. Texaco Lubricants for brake cylinders, car door engines, controllers and the thousand and one mechanical units or parts all down the line, including lubricants for curves and switches.

And each of these places offers us the opportunity to cooperate with you to save money for the road and to demonstrate the value of Texaco Lubrication Engineering Service.

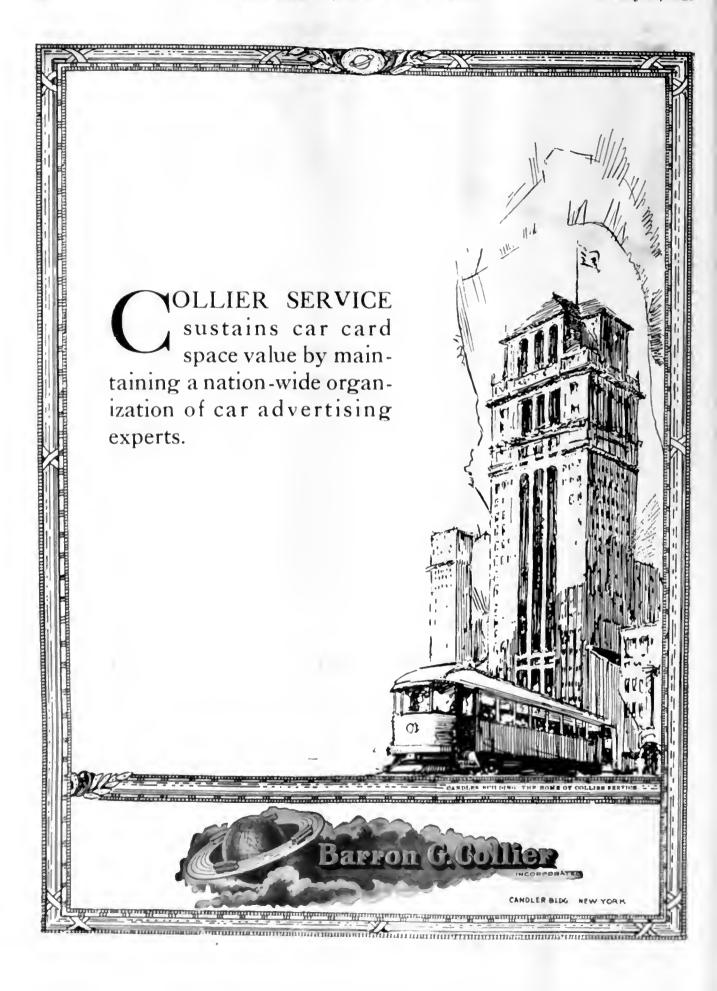
Texaco Lubrication Engineering Service consists in giving you the benefit of the experience of a staff of highly trained lubrication specialists.

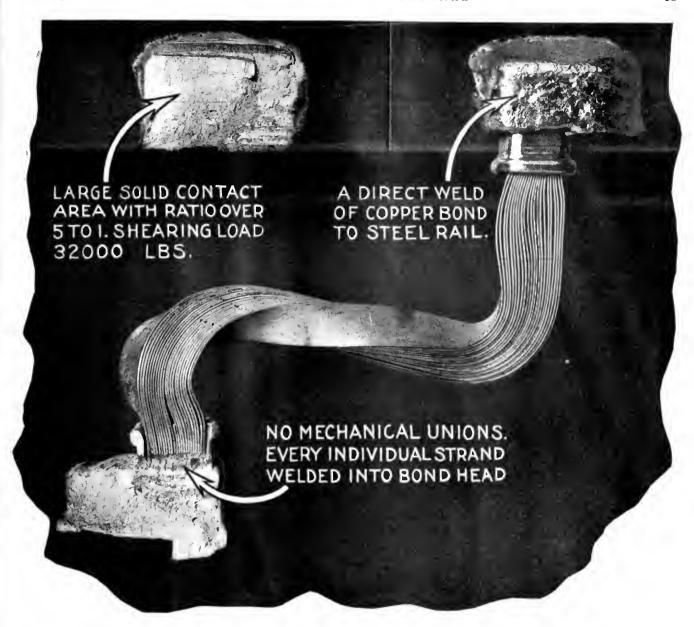
The job of these men is to keep the roads so satisfied with Texaco Lubricants that they'll never consider changing, and it is a fact that roads, which have been sold on Texaco, seldom change.

If you wish to have your lubrication problems solved once and for all, give us the opportunity to "Demonstrate." When you see the way we go about things you, who are responsible for maintenance, will want to turn the whole job over to us.

Really, that's how we get them!—And keep them!







Ruggedness and Strength in That Bond

It's just such qualities as these that give long life to every type of UNA Bond. That simple and sure method of bonding—the UNA Bonding Process—is the means of attaining these desirable rail bond features. By its use, the all copper UNA Bonds are welded direct to the rails. To do this, the bond is placed in a mold against the rail. Then that remarkable alloy—UNA Metal—is added. When the mold is full the bond is finished—a simple procedure requiring no previous welding experience. During the operation every individual bond strand is welded into the bond head and the head to the rail. The welding of copper to steel takes place automatically due to the action of the UNA Metal. It also makes the copper in the

finished heads solid, non-brittle and very tough. This feature gives added strength and ruggedness to UNA Bonds. Referring to the above photograph, 32,000 pounds steady force was required to shear the bond head from the rail—and then the shear took place through the copper head leaving the contact of copper to rail intact.

Besides abundant strength UNA Bonds, being all copper, produce maximum power savings. Other remarkable things about UNA Bonds include speed of installation and low cost. Let us send you a bulletin illustrating some of the different types of UNA Bonds and also a sample showing the weld of copper bond to steel.

Rail Welding & Bonding Company Cleveland, Ohio

MOTIVES



If a man takes the life of another, the law recognizes that motive controls action, and the state will ascertain the motive for the act.

But outside of matters governed by law, little thought is given to motive, although every act of every man, whether at work or at play, is controlled by motive.

Many an employer who imagines his working force and his supervision to be on a high plane, would be amazed to learn that frequently 25% of an annual payroll investment is lost. A loss that could be prevented through the inculcation of sound motives in the minds of the employees.

"The Viewpoint of the Employee Is the Most Neglected Asset in Industry"

SHERMAN SERVICE INCORPORATED

Industrial Co-ordination

Production Engineering

NEW YORK

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CLEVELAND Park Building Pirst National Bank Building

MONTREAL Drummond Hullding

TORONTO
18 Adelaide Street, I

Write us on your business letterhead for copy of our monthly Review of Industry.

of Interest to all traction executives. Address Department BE.



Not your shoulders—but ours!

WHEN Galena Service takes hold of your lubrication, it assumes the responsibility of delivering satisfactory results.

Galena Service Engineers are not theorists, but trained specialists familiar with every detail of your mechanical equipment and its lubrication requirements.

From the selection of raw materials, through the stages of special process in manufacture and to the final application and correct use of the lubricants, Galena Service works for your interest in the advancement of efficient and economical operation.

Through the practical experience and personal cooperation of this competent organization the railways under Galena lubrication are saving thousands of dollars annually by the elimination of the expensive troubles of faulty lubrication.

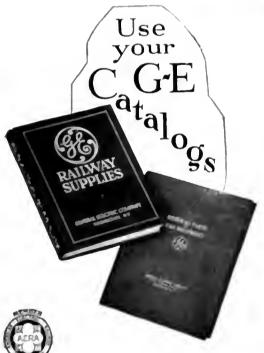
"When Galena Service goes in— Lubrication troubles go out!"



In 1923

Stockkeeping will be simplified





A nation-wide Warehouse Service

We don't urge you any more to stock up with large quantities of G-E Railway Supplies. Quite the contrary. G-E warehouse service has developed to a point where it insures that you can get what you want when you need it.

The General Electric Company maintains stocks of railway renewal parts and supplies in two dozen cities located all the way from San Francisco to New York. The fact that shipments from these complete stocks are made promptly enables you to let us do your stock keeping and thus reduce to an emergency basis your investment in supplies.

This is a G-E service you can't afford to overlook. Take advantage of it in 1923. Use a G-E warehouse for your stock room.

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ELECTRIC RAILWAY JOURNAL

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The Congestion Problem in the Downtown Streets

THE question of how to reduce congestion in the downtown streets of our large cities has led to an approach to this question during this month from two different positions, one in New York and the other in Boston. Both are most radical, but the time is approaching when radical measures will have to be adopted. Halfway measures may help for a short time, but are bound to be temporary only. Both proposals also are merely tentative suggestions. Nevertheless the fact that they are made indicates the serious nature of the situation.

One of these suggestions, contained in the report on city transit by Daniel L. Turner, printed in the issue of this paper for Jan. 13, declares in favor of a policy of excluding the street railways more and more from the center of the city in order to relieve traffic congestion in the streets. The same problem, as considered by the Massachusetts Department of Public Utilities in regard to the heart of Boston, brought another answer. This is that it is probably the automobiles which should be excluded, except when used for certain business purposes or during certain hours of the day.

It is obvious that two bodies cannot occupy the same place at the same time, so that unless additional highways are to be built, some of the vehicles on the streets will have to be taken away. When the question actually has to be settled, however, as to which vehicles to exclude the chances are that the one most economical of space per passenger carried will be retained, and the electric car is the one which can claim this merit.

Three Requisites of Success: Work—Thought—Character

THE goal of every ambitious man is success, although the success pictured by one individual for himself is entirely different from that which is the ideal of another. One wants a competence so that he can take life easy; another thinks he will be satisfied when assured that each of his children will have a good start in life; a third feels that he will not be happy until he is head of his department; and so it goes. All of this is natural and right, but many forward-looking people fail to realize that there is one, and only one, road to the success they desire, no matter what this success may be. The route lies through work—thought—character.

Modern industrial conditions make real work difficult. There is a marked tendency to get by with just as little of it as possible. Putting in time with little accompanying effort is popular. This not only makes the product of work expensive to the employer but deadens the ambition of the individual. If, however, the latter sees in work an opportunity to advance he will do that work as

it ought to be done. The fact that so many people are indifferent to their own welfare makes the chance that much greater for those who are not.

But work is only part of the proposition. A man may work hard all his life and yet not get very far if he doesn't use his head. It is the alert but cogitating chap who forges ahead. He works along steadily, meanwhile studying how he can do more and better work.

One thing more. Work and study in themselves will bring results, but the real thing in the success line comes only to the man of character. This is made up of all of those things which appeal to men as right—thoroughness, loyalty, sympathy and the rest. This is what a prospective employer looks for first. When he gets a man of character who works hard with brawn and brain, that is the man he is looking for and he certainly picks a winner.

An Opportunity for Service to the Electric Railway Industry

THERE is no stronger appeal that can be made to any red-blooded man than to present him an opportunity for service, either to his community or to the industry which furnishes him his means of livelihood. If, therefore, the committees of the American Electric Railway Association, which are in reality committees of the electric railway industry, do not get a satisfactory response to the requests for data which they are sending out, it is because the service appeal in these requests does not get across.

At this season committees are reluctantly sending out questionnaires and requests for help. They would not do this if there were any other way out. You have, through the only centralized organization in the industry, laid certain responsibilities upon these committees, mainly the responsibility for collecting and interpreting the data of the industry for your own benefit. The requests should, therefore, be received in a tolerant spirit and every effort made promptly to comply with them. These committees have no axe to grind; even if they accomplish what they hope to, the results will be accepted as a matter of course. Their reward will be simply that of having done a good piece of work.

During the past few weeks the educational committee has asked for co-operation in carrying out a simple, practical program; the first step is the appointment by each railway company of a man to head up local educational activities and to apprise the committee that this has been done. Responses to this request are coming in, but more speed is necessary if the committee is going to get anywhere this year. The committee on welded rail joints, whose work is to be financed by the American Association, has asked for criticisms of its plans for testing, particularly of the design of the proposed rotary machine. None has as

yet been received. Now is the time to lend a hand at this point, because it is important that no mistakes be made and that the work be inaugurated immediately.

Of course no one likes to get questionnaires, which are in many ways like bills from the tradesmen. They are, so to speak, a necessary evil. But as no one objects to paying his bills when they cover value received, so the questionnaire ought to be answered in the conviction that it too is a bill for value either received or to be received. If one will strike a balance between the value of the help which he has had from outside agencies, which has enabled him to do his work better, against the value of the time which he has taken in putting forth efforts to help others, he will realize that more than full value has been received for every effort expended. This is a universal testimony.

Of course the questionnaires are not perfect. Many of them contain "fool questions." This, however, should not blind one to the fact that the industry progresses through collection and assimilation of data and through co-operation. The data show what have been the results of previous practice; co-operation is pulling together to get better results in the future. In both of these elements of progress the questionnaire plays an important part.

It should be realized also that the committees are pushed for time. Their work must be done within the coming few weeks, hence promptness will be a great aid. Some kind of a reply should be made almost immediately; it is unwise to defer making it until time can be found to do the job as one would like to do it.

Akron to Provide Information on City Bus Operation

ONE of the most interesting and enlightening discussions of the bus in city service that has been heard was that presented before the Central Electric Railway Association last week by A. C. Blinn, based on his use of twenty-four buses in Akron, Ohio, as auxiliary to the street railway. After nine months experience, Mr. Blinn finds himself in a quandary whether the operation of buses is necessary for the local transportation requirements of any city. But he is convinced that the public demand for buses is not subsiding, and that their operation properly belongs to the established transportation company—the street railway.

One definite thing which Mr. Blinn's experience has developed is that there is yet much to be learned about chassis design before a machine is available that will stand up to the very severe requirements of urban service without undue maintenance expense.

A very interesting thing about the Akron experience to the railway and bus fields is the open-minded manner in which the bus question is being aggressively investigated. Every worth-while avenue of study and experimentation is being pursued to determine the best uses of the bus and the means to secure its most economical operation and maintenance. The results thus far have apparently demonstrated that buses cannot be operated with profit within the limits of a 5-cent fare, particularly when a free transfer to the car lines is given. But the study is going on in the hope that the accumulated data and experience will provide knowledge that will, to use the words of Mr. Blinn, "lift us from the wilderness and show us the right road, whether that road leads us into a land of buses or takes us back to

the field of exclusive electric railway service." This attitude provides a basis of experience and development such that both railway men and bus protagonists may watch with confidence the results obtained.

Mr. Blinn's paper is briefly reviewed on page 165 in the report of the C.E.R.A. meeting, but will be printed in full in Bust Transportation for February.

The 5-Cent Fare Level Cannot Come Back Generally

THE present time is surely one of flux in the matter of fares. On the one side, the electric railways wish to maintain the higher scales which came only upon overwhelming proof of the need for them at the time granted. On the opposite side, we have the 3-cent newspapers (once 1-cent) and the 30-cent politicians elamoring for a return to the 5-cent flat fare regardless of higher operating costs.

In all this pother, we cannot overlook the fact that, in the smaller communities especially, no one has grounds to assume that any kind of fare reduction whatsoever will bring back the same degree of street car use per inhabitant. It can be granted that a change from the awkward 7-cent to the convenient 5-cent fare will produce more riders; but it cannot be said that such a reduction will produce as many riders per inhabitant as was the case, say, in 1914. The reason, of course, is the enormous use of the personal automobile.

In 1914 almost every working adult of a community could be looked upon as a potential twice-a-day customer of the street railway. In 1923, that is not so. Why should politicians assume that electric railways are so blind that they have not discovered that competition simply compels them to try any and every means for popularizing their fares and service? In one small city with a 10-cent fare the local newspaper man was very sure indeed that a 5-cent fare meant salvation. He was shown figures that clearly indicated that if the best 5-cent year of the past was repeated, the company would still be 25 per cent or more under the revenue actually coming from the 10-cent fare. Also, with hundreds more nutomobiles in workaday use, the restoration of a 5-cent fare under conditions equal to war-time prosperity would not bring back anything like the old maximum. The newspaper man was not convinced until it was suggested that he would make more money selling papers at 1 cent than at 3 cents!

This leads up to the question: What will the customer yield? If the headways are long, the distances short and the personal machines many, there seems to be no other recourse than to charge a high cash fare to the casual rider, and provide such ticket, weekly pass or monthly card rates as would attract a more consistent patronage. Experiences with the weekly pass and monthly card now cover sufficient time and properties to bring out some facts useful to both sides of the controversy.

Let us bear in mind that we cannot get an assured 75 cents to \$1.25 a week out of people if we cannot give them better than fifteen or twenty-minute service and if the town itself has not enough evening and holiday attractions to induce use of ears for other than industrial riding. But whatever we do, let us fight to the last any attempt to restore the flat 5-cent fare to every size of town, every length of ride and every degree of patronage or lack thereof.

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New York, London, Paris and Berlin Transit Compared—II*

This Section of Mr. Turner's Report Compares Operating Conditions, Such as Fares, Types of Cars Used, Headways, Etc., on the Rapid' Transit and Surface Lines in the Four Largest Cities in the World

By Daniel L. Turner

Consulting Engineer, New York Transit Commission

NEW YORK all of the fares are flat fares. It is a 5-cent fare on the rapid transit and trolley lines and a 10-cent fare on the Fifth Avenue bus lines. In New York the passenger can ride about 24 miles on a rapid transit line for 5 cents.

In London all of the fares are zone fares, on the rapid transit lines, tramways and buses. On the rapid transit lines operated by the "Combine" the ordinary fare varies from 1½d. (2.8 cents) for a mile ride to 12d. (22.6 cents) for an 18-mile ride, as compared with 5 cents for a 27-mile ride in New York.

On the tramway lines the fare varies from 1d. (1.9 cents) for a ride of one section of 0.6 mile to 5d. (9.5 cents) for a ride of twelve sections or 7.2 miles. For a ride longer than twelve sections the charge is 6d.

On the buses the fare varies from 1½d. (2.8 cents) for a ride of two stages of ½ mile each, or a mile in total distance, to 14d. (26 cents) for a ride of twenty-seven stages or 13½ miles total distance.

There is only one class of fare in London, except in the Metropolitan District, where a first-class fare is also charged. This fare is about twice the ordinary fare on the rapid transit lines.

In Paris the fares on the rapid transit lines or subway systems are flat fares, first and second class. It is 50 centimes (3.8 cents) for first-class fare and 30 centimes (2.3 cents) for second-class fare. For this fare a passenger can ride by transfer over the whole Paris subway system, including the lines of both companies, so that so far as the passenger is concerned, although two companies operate the subway lines, they are operated as one under the fare system. The hauls are relatively short on these systems as compared with New York and the London system; the maximum ride from the center to the outer limits of the city is less than 4 miles.†

On the tramways and buses zone fares are in force and there are first-class and second-class fares. The fares on both the tramways and the buses in Paris are the same. The routes generally have three sections, although in a few cases there are four or five sections. The fares are: for one section, 40 centimes first class and 25 centimes second class; two sections: 55 centimes first class, 40 centimes second class; three sections: 70 centimes first class, 50 centimes second class. The suburban tramways operating outside of the fortifications charge 12.1 centimes first class per kilometer of ride and 8.8 centimes per kilometer of ride for the second class. If one has paid his fare and then wishes to in-

crease his ride, he must pay his fare all over again, just as if he was starting a new ride. For example, suppose he paid a one-section fare, first class, amounting to 40 centimes, then decided he wanted to ride two sections; he would have to pay 40 centimes more, or a total of 80 centimes for his entire ride, not 15 centimes more, or the 55 centimes for a two-section ride.

In Berlin, as in Paris, the practice is not uniform as to fares. The rapid transit lines and the buses use a zone fare, whereas the tramways use a flat fare. On the rapid transit lines there are two classes of fare, second and third class, and there are two zones. For a zone of five stations the fare is: second class, 3 marks; third class, $2\frac{1}{2}$ marks. For anything more than five stations; that is, including all the stations on the line, the fare is: second class, $3\frac{1}{2}$ marks; third class, 3 marks. Only two classes of cars are run.

On the tramway lines a flat fare of 5 marks is charged, but monthly and pupils' tickets are issued, which considerably reduce the fare to the users of the tickets. On the buses there are usually three sections to the lines and there is one class. The fare for the first section is 5 marks; for the second section 7 marks, and for the third section 8 marks.

On the Stadt-Bahn and Ring-Bahn lines operated by the steam railroads the fare is: second class, $4\frac{1}{2}$ marks; third class, 3 marks. But this is a flat fare and will carry a passenger anywhere on the Stadt-Bahn or the Ring-Bahn, free transfers between the systems being exchanged.

ZONE FARE PRACTICE NOT UNIFORM

Although zone fares are pretty generally in vogue in London, Paris and Berlin as compared with the flat fare in New York, it is to be noted that the practice is not uniform. London is the only city in which all the different types of facilities employ zone fares, Paris having flat fares on the rapid transit lines and zone fares on the other services, and Berlin having flat fares on the tram lines and zone fares on the other services.

All transit fares have increased greatly as a result of war conditions except in New York, where there has been no change.

I still believe that a flat fare must be maintained in New York City, particularly on the rapid transit lines, if the city's rapid transit system is to be effective in properly distributing its population. Such a flat fare, however, should not only include the ride on the rapid transit line, but should also include the ride on the supplementary facilities, the tramway and the bus lines, which are used as feeders or distributors for the rapid transit lines. But considering the surface facilities, that is the trolley lines and the bus lines, separately,

^{*}Abstracted from the second portion of a report just presented to the New York Transit Commission. Mr. Turner spent last summer in Europe studying city transit conditions. An abstract of the first part of Mr. Turner's report comparing transit conditions appeared in the issue of this paper for Jan. 6, 1923.

[†]See maps in issue of Jan. 13, 1923.-EDITORS.

I believe that a zone fare might be worked out to advantage. If a cheap short-haul fare were available on the tramway lines, and particularly on a bus line service, an enormous amount of short-haul traffic would be developed which is not now obtained by any of the transit systems.

In London, Paris or Berlin there are no free transfers from one line or system to another except on the subway system of Paris, which is a flat-fare system. Whereas in New York, although not as extensive as formerly, there is still a large amount of free transfer traffic.

TYPES OF CARS

On the London rapid transit lines two types of ears are in use. The ears used on the Metropolitan District lines, the shallow subway lines, are generally similar to those in New York in that they have three doors, one in the middle and two near the ends of the ear, but there are no vestibules in these ears, and such end doors as are available are not usable by the passengers going from car to ear, so there is no circulation between the ears. On the tube lines, however, the cars have two end doors entering into vestibules, some of the cars having middle doors. On the District line trains all the doors in the ear are operated independently and are opened by the passengers leaving the train or entering the train. On the tube trains the doors are opened by guards stationed on the platforms, one guard serving two adjoining car platforms, which is similar to the system in use in New York on many of the trains. There are both wooden and steel ears in operation on the London underground system, the older ears being wooden cars and the newer cars being steel cars.

The Paris cars also have three doors, middle doors and quarter-point doors. An effort is made to use these doors for one-direction traffic only. That is, passengers are invited to enter by the middle doors and leave by the end doors, but the practice is not generally followed. Also, there is no vestibule on these ears and passengers eannot circulate from one car to the other in the train. The doors are not operated by any mechanical means, each door being operated independently, although I noticed on some of the trains that the doors of the car can all be closed by the guard simultaneously. Usually the doors are opened by the passengers leaving and entering the car, although where the guard is on the car he opens the door. On the Paris trains there is usually a motorman and three guards on a five-car train, one guard for each ear. The central ear is usually the first-class car on these trains. Both wooden and steel cars are in operation on the Paris subway lines. The most modern cars are very beautifully finished.

The Berlin cars have only two doors, near the ends. They also have no vestibule, so that there is no circulation between the several cars of the trains. They are operated almost entirely by the passengers entering and leaving the trains, as there is only a single guard on a five or six-car train. He rides on the first ear, having a cabin beside the motorman's cab. The Berlin subway cars are composite cars—steel and wood, the substructure only being steel.

As stated in the first article, the general practice in London, Paris and Berlin is to permit the passengers to open the doors in leaving and entering the cars. This greatly shortens the station stop, because frequently the trains are almost unloaded before they come to a stop, and oftentimes passengers board trains after they have started to move. But the conditions of congestion on

these lines is very different from that in New York. The station platforms are never erowded to the extent that our station platforms become erowded, so far as my observations went. In other words, there was no pressure of people on the platforms against the trains sufficient to prevent the passengers from easily getting off. In Paris a passenger is not permitted to enter a station when a train is standing at a platform, or even when a train is entering a platform. Frequently long queues of passengers extend up the stairways and way into the passages waiting for a train to depart and enable them to enter the platform. This same method of excluding passengers from a platform while the train is there is in vogue in London, particularly at some of the busier stations. It was not observed in use in Berlin, however. The result of the practice is that there can be no lastminute rushes to board the train, and it does facilitate the movement of trains under the conditions prevailing.

From one of the busy stations in Paris trains were observed leaving the station with passengers hanging out of the doors, on the second-class cars; very much like we see passengers hanging on the steps of our trolley cars. The first-class cars on the same trains would only be earrying small standing loads.

The dimensions of the ears in use are as given in the following table:

DIMENSI	ONS OF RA	PID TRANS	IT CARS	
New York: I. R. T. B. R. T.	Length 51 ft. ½ ln. 67 ft.	Width 8 ft. 10 in. 10 ft.	No. of Seats 44 a78	No, of Standing Places d165 d225
London: Metropolitan District Tubes	49 ft. 50 ft. 10 in.	9 ft. 82 ln. 8 ft. 11 in.	48 42	d d
Parls: Motor cars Trall cars	46 ft. 42 ft. 10 in.	7 ft. 101 in. 7 ft. 101 in.	b12 c33	be121 ce46
Berlin: Motor cars	41 ft. 11 in. 41 ft. 11 in.	7 ft. 5 in. 7 ft. 5 in.	30 to 35 37 to 39	e36 .

(a) Ninety if only one door is in use. (b) Second class. (c) First class. (d) No restrictions as to standing. (c) Restrictions as to standing not strictly enforced.

There is considerable variation in the number of ears in the trains in the rapid transit systems of the various cities. For example:

NEW YORK Interborough 10-car B. R. T. 8-car	ر الماري trains
LONDON	
Maximum on the Metropolitan District8-car- Mostly	trains
PARIS 5-car trains	0
BERLIN 6-car trains	

The train makeup with respect to motor cars and trail cars is also very variable. In New York the Interborough system varies from two motors to a three-car train to seven motors for a ten-car train. In the case of the B.R.T. trains, they are all motor cars. In London the makeup of the trains varies from one motor car to a two-car train to four motor cars to an eight-car train. In Paris most of the trains are five-car trains, and two motor cars are used, one at each end of the train. In Berlin there is a motor car for every two cars in the train.

The train interval in New York theoretically is placed at a minimum of one and one-half minutes, but in practice the minimum obtained on the express tracks is about one minute forty-eight seconds. The minimum interval is only reached during the non-rush hours when traffle congestion does not obtain. In London and in Paris the very minimum interval is about one and one-half minutes. In London as many as forty-two trains an hour have been operated past the Victoria Station. This has only been accomplished by employing what is called an "automatic hustler." This consists of a siren whistle which is blown by the platform man on the station as soon as the thirty-second stopping time expires. Immediately the train is started. It is a warning to passengers and train crews that the train is going to start forthwith. By using this device, the company has been able to reach its maximum operation per hour. The general minimum interval on these lines, however, is about two minutes. In Berlin the minimum interval is about two and one-half minutes. There is no express service operated in London, Paris or Berlin similar to the express service operated in New York over the fourtrack lines. They do operate in London so-called express trains which skip stations as some of the B. R. T. express trains do which are operated on the elevated system.

The express tracks on the New York system permit a higher average speed to be attained than on any other lapid transit system in existence, the schedule speed being 25 m.p.h. The maximum speed of trains on the local service is 18 m.p.h. At the height of congestion, however, in New York these speeds are not obtained. The speeds of the subway systems in London, Paris and Berlin are generally less than in New York. In London it is estimated to be about 16 m.p.h. on the average. In Paris the average speed is only about 12 to 15 m.p.h. and in Berlin somewhere between 12 and 15 m.p.h. is obtained. All these speeds include station stops.

Trains on the rapid transit lines in London and Paris do not operate all night. Usually the service is suspended from about 1 o'clock to 5 o'clock in the morning. Information as to all-night operation on the rapid transit system in Berlin is not available. In New York once a rapid transit service is inaugurated on a new line it never stops. Service is provided all day and all night on weekdays, Sundays and holidays.

On the rapid transit systems in New York the method of ticket control is in the transitory stage. The automatic turnstile is generally being substituted for the old ticket booth and ticket chopper box control. 'There are no turnstile systems in vogue in London, Paris or Berlin. The ticket system is used. In London, which has a zone fare system, a passenger purchases a ticket to his destination. This ticket is punched as he enters the station and is taken up at the debarking station. There are automatic ticket-selling machines installed at some stations, in which a passenger can deposit the necessary coin and obtain his ticket. In Paris, with a flat fare system on the subway lines, the ticket system is also used. The tickets are stamped with the name of the station where purchased, the day of month and time. The ticket is supposed to be used within the hour and is punched as the passenger enters the train platform. If he is a first-class passenger, he gets a ticket of one color; a second-class passenger gets a ticket of another color. If he is riding first class the guard on the first-class car, which is at the center of the train, inspects his ticket and punches it to be sure that a first-class fare has been paid. On the second-class cars the tickets are not examined. The tickets are not taken as the passengers leave the stations, but receptacles are provided into which they can throw the tickets away if they desire to do so. At most transfer points bodily transfer is used.

In Berlin, where the zone fare operation also prevails, a ticket is purchased to destination. It is punched on

entering the station and taken up when the passenger leaves the station. It may also be inspected on the train.

In Paris two methods of indicating the routes are utilized in the cars. One is to place on the door jamb, just over the door handle, a list of all of the stations from terminal to terminal. The other type of sign is a triangular sign placed transversely on the car ceiling, with a diagrammatic map of the lines on each face, with the stations in bold figures and the transfer stations indicated. Usually one of these signs is placed opposite each door, so that each passenger on the car, by looking up, sees the whole route of the line clearly displayed, and sees the relation of the station to which he is bound to all the other stations on the line. The passenger follows the stations on the signs on the cars, and thereby determines when he is to get off; for generally there is no announcement of the stations by the guards, except in the London tubes, where the guards call off the stations just as on our lines.

TROLLEYS OR TRAMWAY LINES

In New York all of the trolley cars are single deck. In London and throughout England the double-deck cars are used. Most of the cars in London have the upper decks inclosed in glass, although some open-deck cars are operated. In Paris and in Berlin, single-deck type of cars are used exclusively, but trail cars are used in Paris and Berlin to take care of the rush-hour traffic. In some cases three-car tramway trains were noted, particularly in Berlin.

In New York the trolley car lines stop at every cross street except under a few special conditions and the cars stop on the near side of the crossings. In London, Paris and Berlin the practice is to designate the stopping points on the tramway lines. The distances apart vary, but there are always several blocks intervening. In London and Paris the stopping points are designated by special post signs. Usually on these posts there are signs which indicate the routes which pass and stop at such stopping points. The routes of the tramway lines are usually designated by numbers. In London and in Paris small folded pocket maps are supplied to passengers, upon which all of the routes of the tramway lines are indicated and described. Those in London are given to passengers free. In Paris the map costs the passenger a few centimes. There is another practice in Paris which is a very commendable one. At all of the stopping point posts a set of numbered tickets is posted. Each passenger tears a ticket off as he arrives at the stopping point. When the car stops the passenger is permitted to board the car in the order of the number which he holds, so that if there is not room enough on the car for all of the passengers those who come first are served first. Where the traffic accumulating at a point is too great to permit this system to be utilized, then the passengers are lined up in queues.

In New York there is no restriction on standing in any of the surface cars.

In London the double-deck type of cars generally in use seat seventy-eight and sixty-two respectively and limit the number of standees to ten and eight respectively. Standing is permitted only on the lower level.

In Paris the cars are of relatively small seating capacity, ranging from twenty-four to thirty-six. The twenty-four-seat cars permit twenty-five to stand; the thirty-six-seat cars, eighteen standing. These cars are all of the center-door type. When motor cars are operated alone, the front half of the car is reserved for first-class

passengers and the rear half of the car for second-class passengers. When motor cars and trailers are operated together, the motor car is reserved for first-class passengers and the trailer for second-class passengers.

In Berlin the cars seat twenty and thirty and carry sixteen and twenty-one standing, respectively. I do not believe, however, there is any restriction on the number of standing passengers in Berlin.

The weight of the New York cars empty varies from 843 lb. per seat, for the New York Railway cars, to 500 lb., the minimum weight per seat, of the one-man cars. Compare these weights with the double-deck cars in London, which vary from 423 lb. to 390 lb. per seat. In Paris the weight of the cars varies from about 770 to 1,060 lb. per seat. These weights are large compared with the weights of the heavier New York cars. The weights of the Berlin cars are not available. It is very obvious, from the foregoing, that there is a great advantage in utilizing double-deck cars where it is possible to operate them, because of the possibility of reducing the weight per passenger to the minimum.

In New York the speed of the trolley ears through the most congested areas gets as low as 5 m.p.h., although it gets as high as 91 m.p.h. in the residential districts. The slower speeds are slow as compared with the corresponding speeds of the tramways in London, Paris and Berlin. The speed attained in the outlying sections, however, compares favorably with those in the other cities mentioned. In London the tramway cars reach a speed of 8 m.p.h. in the congested areas and 10 m.p.h. in the residential areas. In Paris the corresponding speeds are 7½ m.p.h. and 8.4 m.p.h. respectively. It must be borne in mind, however, that in London and Paris the tramway lines do not operate into the most congested part of the center. In Berlin the speeds vary from 4.5 m.p.h. to 10.3 m.p.h. in the congested and residential sections, respectively.

OWNERSHIP AND OPERATION OF THE TRANSIT LINES

There are three companies operating the rapid transit lines in New York, and they operate about forty-seven routes all together, main-line and short-line routes. In London there are thirteen companies that operate about thirty routes. The deep tube lines are all operated independently, but there are a number of joint routes operated over the Metropolitan District lines. In Paris there are two companies operating twelve routes and in Berlin one company operating seven routes.

In London and Berlin the city owns and operates the tramway systems. In London I am referring to the tramway systems serving the municipal area. All of the other facilities, that is the rapid transit lines and the bus lines in these two cities, are privately owned and privately operated. In New York the city does not operate any of its facilities. But the city owns all of Its new rapid transit facilities and leases them to private operators. All of the trolley lines and the Fifth Avenue Bus line are privately owned and privately operated. But Paris is the only city where eity ownership of all the facilities and the operation of them by private companies practically prevails. There is only one exception to this universal progrem, and that is the Nord & Sud rapid transit line, a very small part of the Paris transit system. The Paris Rapid Transit lines are owned by the city and operated by one private company. The Paris tramway and bus lines are owned by the city and operated by another company. In other words, rapid transit operation is consolidated under one operator, practically, and surface line operation is consolidated under a single operator. There was talk of the possibility of both rapid transit lines and the surface lines being consolidated under a single operator. In other words, Paris has made the greatest advance in municipal ownership and private operation. Paris has practically attained what New York City is endeavoring to attain under the Transit Commission's plan.

Recent Pacific Electric Station

DUE to the growth of certain sections served by its lines, the Pacific Electric Railway has recently built several combination freight and passenger stations. One was described on page 119 of the issue of this paper for Jan. 21, 1922, and another on page 1205 of the issue of Dec. 11, 1920. Two other stations were recently completed, one at West Hollywood, the other at East Long Beach. Particulars of the latter follow:

Its length over all is 86 ft. 11 in., and width over all, 24 ft. 9 in. The height to the ridge of the roof is 19 ft. 6 in. There are loading and unloading platforms on each side, as well as an end platform convenient to the driveways. There is also a ramp approach for handling automobiles, heavy oil-well ma-



Late Design of Combined Freight and Express Station, Pacific Electric Railway

chinery, eable, etc. At one end is an open type waiting room, 16 ft. 2 in. x 24 ft. 9 in., while within there is an inclosed waiting room 10 ft. 9½ in. x 24 ft. 9 in. An outside drinking fountain is provided as in all recent stations of the company, and the building is equipped with the company's standard type of fire equipment, described in the issue of this paper for Aug. 26, 1922.

A National Museum of Engineering and Industry

THE joint committee on a National Museum of Engineering and Industry appointed by the four founder engineering societies of United Engineering Society is composed of Edward D. Adams and Charles L. Clarke of the A.I.E.E., Frederic A. Delano and Dr. George F. Kunz of the A.I.M.&M.E., Clemens Herschel and Nelson P. Lewis of the A.S.C.E., and Reginald Pelham Bolton and H. F. J. Porter of the A.S.M.E., the latter acting as chairman.

This committee in co-operation with the National Museum of the Smithsonian Institution at Washington, D. C., is formulating a plan for a great national museum of engineering and industry similar in character to some of the foreign museums.



A Characteristic View in Sea Breeze Park

An Amusement Park that Pays

By Close Co-operation with Concessionaires in Park on Lake Ontario the New York State Railways,
Rochester Lines, Has Made This Park a Recreation Center for the Population
of a Large Adjoining Area—Admission to the Park Is Free

THE New York State Railways, Rochester Lines, owns a beautiful park known as Sea Breeze, located on the shore of Lake Ontario about 6 miles in an air line northeast of the business center of Rochester. On its eastern side Sea Breeze Park stretches along the historic Irondequoit Bay. It is about 28 acres in extent. The park is reached by a direct line from Main Street, Rochester, and by a line running to Glen Haven Park near the head of the bay, from which Sea Breeze can be reached by the launches of the Irondequoit Bay Navigation Company.

The efforts of the railway company to make the park attractive have made quite a reputation for it in western New York, so that it is coming to be known as the Coney Island of the region. People come from points as far distant as Oswego, located on the lake front 60 miles to the east. The Rome, Watertown & Ogdensburg

division of the New York Central Railroad runs through the property, rendering it accessible to a large number of people, and a boat line connects it with Ontario Beach, a popular bathing resort 5 miles to the west.

Sea Breeze nearly adjoins Rochester's most important public park, the Durand-Eastman Park, wherein are extensive zoological collections and bathing facilities operated by the city.

No Competition with City Parks

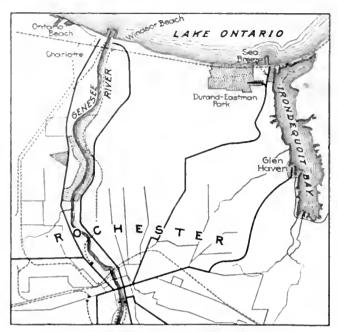
The purpose behind Sea Breeze is to furnish an amusement center rather than a park in the usual sense, because the city has an admirable park system. Arrangements have been made with a large number of concessionaires by which amusement features of high grade are furnished, and the park is on a paying basis. On account of the accessibility of the park, it would at



One of the Open Air "Thrillers"



The Entrance to the "Jack Rabbit" Is Simple But Effective



Outline Map Showing Relation of Sea Breeze Park to Rochester

first appear as if the company's policy of charging no admission would make its operation on a self-supporting basis difficult. The fact is, however, that a fair part of the persons patronizing the park reach it by the New York State Railways lines. The free admission plan, further, obviates the necessity for fencing in the park, which would render it less attractive and also impose many mechanical difficulties. As the company participates in the profits of the concessionaires, it benefits to some extent from the expenditures of persons who come by means of transportation other than the cars. The picture of a root beer stand, of Oriental characteristics, shows a typical concessionaire's structure.

The popularity of the park is indicated by the fact that as many as 25,000 people visit it on a pleasant Sunday, and it is popular also throughout the week for picnics and excursions. During July and August, 1922, 400,128 fares to and from Sea Breeze Park were collected, indicating that one-half this number of persons visited the park by trolley. The maximum number of fares on any one day was 20,131, on July 30.

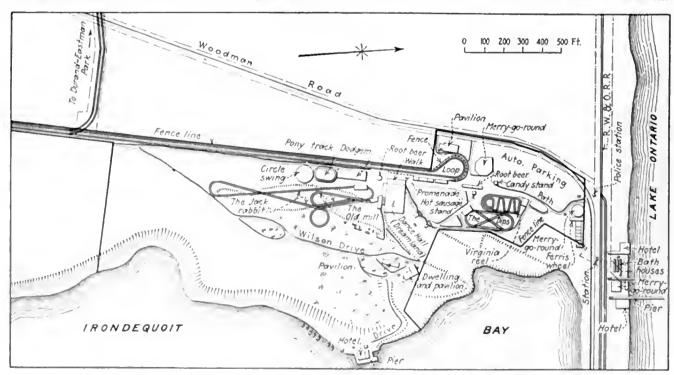
The fare from points in Rochester to Sea Breeze Park covers two zones. The city fare is 7 cents cash (or four tickets for a quarter) and the suburban fare is 10 cents for adults and 6 cents for children, with a reduced round-trip rate for adults of 15 cents. A parking charge of 25 cents each is made for automobiles, a liberal space for parking being provided as shown in the accompanying map. At the park the cars are unloaded at one point and loaded at another so as to avoid congestion.

GOOD WORKING ARRANGEMENT WITH CONCESSIONAIRES

The concessions in the park are of the usual variety, but the company has been able, on account of the large profitable business and the use of a co-operative policy to secure attractions of unusually high grade. The topographical features of the site have been carefully utilized.

Interest centers in "Dreamland," the largest dance hall in western New York, 150 ft. x 110 ft. in plan. This is of pleasing architectural design and embodies the following unique features: The roof is built in semicircular form, covering the entire dance floor, which is sunk 2 ft. below the porch floor. The building was erected in a ravine on 30-ft. piles. It is thus possible for people in the park to view the interior from the ravine banks on both sides of the hall.

The company does not operate any of the park features, but rents privileges in general on a basis of a minimum rental plus a percentage of gross receipts. All construction work is done by the concessionaires. The contracts run from one to fifteen years, depending upon the amount of investment which concessionaires can make in developing their features. A few privileges are rented on a flat basis, but the general method mentioned worked out best for both sides. As the com-



General Plan of Sea Breeze Amusement Park, New York State Rallways, Rochester Lines



"Dreamland" Is the Name of the Large Dance Hall

pany's property borders on the water, the concessions include privileges of renting rowboats and furnishing bathing suits and bathhouses.

A feature which some of the concessionaires have found desirable in connection with the charges is the use of the pay-as-you-leave plan. On entering a concession, patrons receive serially numbered tickets which are punched as they repeat their rides, etc. This, it is thought, increases the use of the facilities. Recently the concessionaires cut their rates from 15 cents to 10 cents, in recognition of the "reduced cost of living."

To permit the concessionaires to act as a unit, with regard to all matters affecting them collectively, they have organized the Sea Breeze Park Concessionaires' Association, which functions through an executive committee of three. This facilitates dealings with the railway company, particularly in regard to the furnishing of general attractions.

One of the most important factors in the success of the park has been the furnishing of free open-air "stunts" of a thrilling character. It was found that the public reacts to "thrillers," and as a consequence from ten to twelve of these are provided during the season. The engagements of the performers are usually of one week duration, and in general only one act is featured at a time.



At Sea Breeze It Is Like Being in the Woods

One of the most popular acts was ski jumping, where the performers coasted down a greased incline and made sensational leaps over a rise at the bottom. Another success was a bicycler, who coasted down an incline and also made a flying leap. Expert diving proved to be an attractive act. A performer who won great applause was a sailor who climbed a tall flexible pole and did many chill-provoking acrobatic feats high in air.

The plan in all of these outdoor acts was to have the performer as high in the air as possible so that he could be seen by the greatest number of people. These openair attractions cost from \$750 to \$1,200 per week, and they were arranged through several New York amusement booking agencies.

Advertising has played an important part in the success of Sea Breeze Park. The special acts are featured in the amusement columns of the daily newspaper of Rochester. The special acts are also advertised by means of posters on the car ends. A special attempt has been made to induce churches, fraternal organizations, and other bodies to hold their picnics at the park, as these not only furnish patronage for the amusements, but provide morning, off-peak traffic for the car lines. This business is so promising that the company may put on a special man to solicit picnic business next season.





Left-This Refreshment Stand Is of Oriental Design. Right-Two of the Popular Amusement Devices

Intensive Public Relations Work

Manager of Ohio Interurban Road Calls to His Aid Many Known Helps and Some Previously Unknown in Effort to Restore Line to Popular Approval and Prosperity

WHAT is the dollars and cents value of good will to an electric interurban railway?

Can improved public relations spell the difference between a surplus and a deficit at the end of the year?

How much of a business getter is a friendly attitude on the part of the people toward an electric railway?

Is it possible to pull an almost defunct electric interurban railway out of the depths of a receivership on to the heights of prosperity largely by centering intelligent effort on the promotion of proper public relations?

The answers to those inquiries are undoubtedly sought by every electric railway operator in the country, but a newcomer in Ohio is actually experimenting in an aggressive way to get the answer. His name is John S. Bleecker.

With headquarters at Springfield, Ohio, Mr. Bleecker is acting as vice-president and general manager not only of the Indiana, Columbus & Eastern Traction Company but also of the Columbus, Newark & Zanesville line. To say that he has revolutionized these two systems since he has been in charge would not be quite accurate, but to state that he has adopted revolutionary tactics in attempting to put these two lines on a paying basis would be precise.

For example, Mr. Bleecker has just ordered the removal of each and every "Don't" sign from every car on his two lines and all other property owned by the companies. This order removes such signs as:

"Don't put your feet on the seats." "Don't smoke." "Don't spit on the floor." "Don't drink intoxicating liquor on these cars. "Don't loiter around this station."

It is Mr. Bleecker's opinion that whatever words of caution it may be necessary to give to patrons of his roads can be much better expressed than in the negative command expressed by "Don't." He also believes that the numerous "Don't" signs on the electric interurban railway company's property tend to drive patrons away rather than encourage them to continue their patronage.

Mr. Bleecker has done many other things since taking charge. For instance, each of his conductors has a personal business card, thanking car riders for their patronage and asking suggestions for improvement of service. On the reverse side of these "Thank You" cards is a small condensed time-table. So successful have conductors been in making friends with these cards that requests for similar cards have come from motormen on the lines. Here is a sample of the cards:

THANK YOU

We are very much pleased to have been able to serve you on your journey today, and hope that our service will prove satisfactory in every way.

prove satisfactory in every way.

It is our aim to render uninterrupted and dependable transportation, and your co-operation by telling others if we do, and us if we don't, will greatly assist in improving and maintaining the class of service you are entitled to.

We will appreciate your suggestions.
THE INDIANA, COLUMBUS & EASTERN TRACTION COMPANY.
CHARLES GERDES, Conductor.

One of the first things that Mr. Bleecker did upon assuming control was to try to notify the public, by every means possible, of the economics underlying interurban operation, the effect of motor vehicle competition, and other facts pertaining to the business of transportation. He did this in many different ways, employing newspaper interviews, hanging huge painted signs on the sides of the cars and displaying a series of "How Come" poster cards in the cars.

In the series of "How Come" cards he asked pertinent questions, such as:

"How come you can ride on this car at such a low rate of fare?"

and then immediately stating the answer beneath it, which, in this instance, was:

"Because the owners, the security holders, are content to forego any return on their money, but how long will they continue this generosity?"

Then, on the outside of a number of the cars, so that all might read, he painted in letters several feet high such pertinent and thought inspiring sentences as:

"Traction travel 3 cents per mile.—Highway travel?"

Deciding that the only way to get business was to go after it, Mr. Bleecker arranged with the more important hotels in the larger cities of his lines to place in each guest's room in these hotels a card advertising the representative hotels in the cities touched by his lines and telling how to reach the cities and towns by means of the lines of the Indiana, Columbus & Eastern Traction Company. At present twenty-five hotels in seven cities are getting the company's folder service in approximately 6,000 hotel rooms, the occupants of which are potential I., C. & E. eustomers.

By means of employees' meetings and the distribution of pamphlets and booklets, Mr. Bleecker has sought to impress upon every operative in his company the necessity for knowing about the business in which he is engaged something more than the mere routine of his daily tasks. He has impressed upon the employees the spirit of being courteous and pleasing to the public and has shown them how the operators of the property, the employees and the public are mutually interested in the company's welfare. Scenes of interest along the

company's route, too, are being pointed out by means of large illuminated signs. The wording of the sign of this kind at Camp

Chase is shown.

Camp Chase—The west outpost of the fluckeye Capital. Land to the south was site of Federal prison during the Civil War

This stop is made by traction ears for conductors to register for clear track.

THE INDIANA, COLUMBUS & EASTERN TRACTION CO.

Mr. Bleecker's attitude toward the newspapers has gained the friendship of these makers of public opinion. Newspapers are informed direct from the company's offices of every accident that occurs almost immediately after its occurrence and as speedily as the company executives learn of it. They are also told of any other thing that the company officials believe will be of interest either to the editors or the public at large.

Mr. Bleecker has made it a point to address meetings of the members of the Chamber of Commerce, Rotary Club, Kiwanis and other organizations and to point out to them their interest in co-operation with the electric trolleys. In short, Mr. Bleecker is omitting little and doing much to gain the good will of the patrons of his roads, in an effort to determine whether the key to prosperity for these roads is not concealed somewhere in that much discussed, universally applauded, but so infrequently well-handled matter of public relations.

Richmond Valuation Report Published

Returns from Two Methods Followed Are Very Close, but Both Are Much Lower than That Found Two Years Ago—Accrued Depreciation, Overhead Charges, Deficiency in Earnings and Contractors' Profits Discussed

N DEC. 30 John A. Beeler reported to the City Council of Richmond the completion of his valuation of the Richmond railway division of the Virginia Railway & Power Company. The valuations determined by him and those of Stone & Webster made some two years ago are given below:

Mr. Beeler says that the extremely high figure of the Stone & Webster historical appraisal can be accounted for by its inclusion of \$10,697,100 for deficiency in earnings and going concern value, items which do not appear in any other valuation, and that the 1920 cost of reproduction is high because of the abnormal prices on which it is based and the fact that no allowance is made for depreciation. It is a coincidence only that the three other valuations agree closely, as in the Stone & Webster figures based on 1914 prices there is no deduction for depreciation, and the two Beeler figures are based on entirely different principles. Mr. Beeler finds the par value of securities allocated to the property on the historical investment basis to be \$10,413,131.

REPRODUCTION VALUATION

In his reproduction valuation Mr. Beeler used the same inventory as Stone & Webster with the exception of certain items. These account for a decrease of \$271,613 for labor and material in the 1920 reproduction cost, and certain items in the overhead, which made the total figure \$380,000 less.

In commenting on 1914 and 1920 bases for prices, the report declares that 1914 figures are much more difficult to check. Hence, their accuracy is more open to question. Many dealers do not retain in their files accurate quotations for such a long period of time, and in making an estimate there is no particular reason why a dealer should quote a low figure for 1914, especially since a comparison with the 1920 price will in any case show an enormous increase. As for 1920, the prices for that time approach the height of the inflation period following the armistice, when no railway attempted any large construction jobs, either for extensions or renewals. For this reason, the report declares, a valuation for rate-making purposes on a 1920 basis would be unfair to the public. A difference of 32 per cent was found in prices for labor and material between Jan. 1, 1920, and Jan. 1, 1922, prices.

In determining his final figures Mr. Beeler omitted the valuation of the power equipment, \$352,849, by agreement with the company. He also omitted contractor's profit on land, right of way, rolling stock, crossings and fences, miscellaneous equipment, shop equipment, tools, furniture and fixtures, and materials and supplies, because with an operating company "a contractor would have little or no advantage over a railway, either as to cost or excellence of the work," and because "it is to the company's advantage to have a track maintenance and construction force available." A different practice was also made with regard to taxes and interest during construction. In the Stone & Webster valuation taxes during construction were figured on one-half of the entire property for a period of one year at the actual rate prevailing in 1913 and 1919 for the 1914 and 1920 appraisals respectively. In the Beeler valuation it is the contention that taxes would be assessed on only a portion of the physical property and that for the second year only, so that they would not become payable until after the commencement of operation in 1920, so this item has not been allowed. As for interest during construction, the report says:

The above reasoning applies almost equally to the item of interest during construction. The money required would need to be made available only as actually used to pay the construction costs. Since a very considerable portion of these costs would apply in the second year, it would be necessary to have at the end of the first year sufficient money to pay for the construction work completed at that time and to provide for advance payment on material needed immediately. Such items as machinery, ears, etc., which are purchased complete, would be paid for on delivery or in some cases after delivery. This would mean that the interest period would be far shorter than one-half the construction period. We believe that a fair allowance would be to include interest at the current rate for three-fourths of the period of two years, but on one-half of the items of property only, with the exception that land is included for a full period of two years.

Contractors' services at 10 per cent were allowed by Mr. Beeler only for the following items: Grading,

TABLE I—ESTIMATE OF DEPRECIATION BY MR. BEELER

Acct.	l'tem	Repro- duction Cost	Non-De- preciable Portion		Condition Depreciable	-
104 105 106 107 108 110	Grading. Ballast. Ties. Raile and fastenings. Track special. Paving. Track laying and sur-	\$344,154 381,475 223,219 652,368 258,812 628,215	\$137,662 130,474 15,529	\$206,492 381,475 223,219 521,894 243,283 628,215	62 62 62 62 62	\$78,467 72,480 84,823 198,320 92,448 238,722
112	faeing	344,115 11,082	443	344,115 10,639	62 60	130,764 4,256
116	culverta	647,566 1,544	32,378	615,188 1,544	75 60	153,797 618
118	signala Telephone and tele-	2,434 3,764	753	2,434 3,011	80 80	487 602
119 120 122	Poles and fixtures Underground conduits. Distribution system	125,714 57,952 314,775	125,910	125,714 57,952 188,865	52 80 79	60,343 11,590 39,662
125 126 127 128	Substation buildings General office buildings Shops and carbouses Miscellaneous bldgs	78,642 468,344 67,133	• • • • • • • • • • • • • • • • • • • •	78,642 468,344 67,133	88 70 70	9,437 140,503 20,140
131 132	Substation equipment. Shop equipment and tools	53,508	2,140	51,368	67	16,951
133 135 136	Park and resort property	53,337 1,164,433	116,443	53,337 1,047,990	50 57	26,668 450,636
137	Locomotives Electrical equipment of cars Other rail equipment	695,349 24,350	69,535 2,435	625,814 21,915	59 49	256,584 11,177
139	Miscellaneous equip- ment	21,537 18,666	1,077	20,460 18,666	70 70	6,138 5,600
	Total	\$6,642,488	\$634,779	\$6,007,709		\$2,111,213

TABLE II-ESTIMATED COST TO REPRODUCE NEW LESS DEPRECI-ATION AS OF JAN. 1, 1922, BASED ON COMPANY'S VALUATION AS OF JAN. 1, 1920, PREPARED BY STONE & WEBSTER, INC.

(a)	new as of Jan. 1, 1920; Labor and ma cluding supervision and omissions	terials, in- and con-	410.142.747	
(b)	tingencies. Adjustments: Deductions for errors. Additions account of errors.	\$323,758 52,145	\$10,163,262	
	Net deductions for errors	\$271,613		
	Deduction for transfer of power equip- ment to power department	352,849	624,462	
(c)	Less 32° to adjust to Jan. 1, 1922, price		\$9,538,800 3,052,415	\$6,486,385
(d)	Allowance for contractors' services			156,103
(e) (f)	Construction cost to reproduce new t 1920 inventory at Jan. 1, 1922, prices. Net additions 1920 to Jan. 1, 1922			\$6,642,488 134,412
(g)	Total construction cost of physical			\$6,776,900
(p)	Net depreciation: Depreciation on physical plant (Table Less amount available in depreciation	1)		1,441,024
(j)	Net depreciated value of physical prop	erty as of		\$5,335,876
(k)	Jan. 1, 1922, exclusive of land	l'ebster's 19	20 appraisal,	477,687
(l) (m)	Legal expenses	.7% of (e) .8% of (e) .2% of (e) .0%	\$245,772 119,565 79,710 376,261 419,297	\$5,813,563
	Interest on cost of selling accurities		25,158	1,265,763
(a) (p)	Value of plant as of Jan. 1, 1922 Materials and supplies on hand Jan. 1, 1	922		\$7,079,326 116,338
(q)	Total value of Richmond railway division	n as of Jan.	1, 1922	\$7,195,664

bridges, trestles and culverts, underground conduits, general office buildings, shops and carhouses, miscellaneous buildings, parks and resort property. Another reduction in overhead was made by omitting an allowance for working capital, except that represented by materials and supplies on hand. In this connection the report declares that a street railway differs from a light and power company in that its service is conducted on a prepayment basis, so there should always be a cash balance available for current expenses where the cost of service is less than the revenue.

In determining the accrued depreciation, estimates were made of the useful life of each of the major parts of the equipment and their condition. The corresponding ages of the parts were obtained where possible from the records of the company and from the two the proportional amount of accrued depreciation has been calculated. The result is shown in Table I.

The overhead items total \$1,265,763 or 17.8 per cent of the labor and material cost to reproduce new the physical property including land. Table II shows summary of the methods of obtaining this valuation.

HISTORICAL INVESTMENT VALUATION

The starting point for the historical investment valuation of Mr. Beeler was the purchase of the property and some of its allied properties on May 5, 1909, from the receivers then in charge, for \$8,100,000, which brought the total price of all the properties to \$10,809,000. Of this latter sum the amount to be subject to certain existing mortgage and other liens attributed to the Richmond railway system was taken by Mr. Beeler at \$4,413,440. Adjustments made since that time and allowed in the report are shown in Table III.

The report compares this figure with the historical appraisal of Stone & Webster of \$20,249,400 and says that the latter, to get this figure, added \$11,750,500 exclusive of cash and materials on hand for highly

theoretical overhead expenses to what they call the "bare bones" cost of the physical plant. This is shown as follows:

Physical plant										,			
Added for general overhead													
the state of the s													
Going concern value													
Increment in land values.													
Total				,		4							\$20,424,60

Referring to the largest item, the Beeler report says that this was determined by computing a return of 8 per cent on the physical plant, plus the investment in cash and materials, from which was deducted the net earnings after taxes, less an arbitrary allowance for renewal reserve, and as reliable earning figures were not available for several of the companies prior to Jan. 1, 1902, the statement starts with that year. Mr. Beeler finds, however, there is no evidence that the company had any losses, that the major portion of the plant was old when this "deficiency in earnings" was begun, and the rate is beyond anything allowed at that time for a return on a normal investment.

The going concern value in the Stone & Webster

TABLE III—RETURN ON ACCUMULATED HISTORICAL INVESTMENT, 1910-1921

Year	Average Investment and Working Capital	Adjusted Net Income	Rate of Return	Year	Average Investment and Working Capital	Adjusted Net Income	Rate of Return
1910	\$4,505,585	\$345,933	7.68	1918	6.519.716	347,507	5.33
1911	4.713,208	414.756	8.80	1919	6,621,127	184,382	2.78
1917	4,909,120	361.026		1920	6,847,305	204,307	3.00
1913	5,062,899	439,808	8.69	19200		21,192	0.60
1914	5,267,567	406,089	7.71	19716		66,264	0.93
1915	5,899,512	358,849			*********	00,204	0.73
1916	6,421,221	391,957		Total	\$77,359,861	\$3,928,700	5,32
1917	6,441,126	386,624		. 0	****	45,720,700	3.32
(-) 4:-	annually and		D 21	48 3 998			

(a) Six months period ending Dec. 31. (b) Fiscal years ending June 30, except 1921 ending Dec. 31.

historical valuation was figured on 15 per cent of the value of the physical property as determined by that appraisal. In discussing this, the Beeler report says:

The addition of any amount of going concern value may be admissible in certain cases, but in our opinion it does not apply here. It may be applicable when considering light, power and certain other utilities or industrial enterprises, where a large and profitable business has been built by solicitation, advertising, salesmanship, or other effort involving work and expense, possibly over a long period of years. It may be applicable to some highly specialized industries with national reputation or valuable trade names or products. Possibly a utility that has for years been conducted with highly profitable results, paying continuously a large return on its investment or securities, may justly make claim for going concern value.

There are instances of certain highly organized traction properties in densely populated districts, which by reason of physical limitations have practically no competition. properties with good management and good service may make claim to such an overhead with some degree of These advantages, however, are not applicable justification.

to Richmond propery.

SECURITIES ISSUED

Mr. Beeler considers that the securities which might be properly allocated to the Richmond railway division amount to:

First mortgage bonds Preferred stock Common stock	\$5,117,920 92 2,753,118 59 2,542,091.08
Total par value	\$10,213,130.59

He also points out that in the Richmond stock market the asked prices of these securities with the bonds at 85, preferred stock at 76, and common stock at 27, amount to \$7,128,967.50, or very close to the values which he determined for the property.

Association News & Discussions

C. E. R. A. Enjoys Louisville Hospitality

Members of Central Association Given a "Safety Dinner" by Louisville Railway—Meeting Brought Forth Informative Papers and Discussion on One-Man City and Light-Weight Interurban Cars, Automatic Substations, Buses, Etc.—J. P. Barnes Elected President

THE annual meeting of the Central LElectric Railway Association last week resulted in a profitable, entertaining and enjoyable gathering. Well attended by both railway and supply members, the two-day session at the Hotel Seelbach in Louisville, Ky., was featured by the election of J. P. Barnes, president Louisville Railway, to the office of president of the association for the ensuing year and by the hospitality of his organization in arranging for the special and entertainment portions of the program. Not only did the Louisville Railway men take care of members adequately in this respect but they also furnished a considerable part of the meat of the program in the way of prepared papers.

As hosts the Louisville Railway people proved themselves second to none. The Southern spirit of hospitality prevailed throughout but reached its climax in the dinner and entertainment provided on Thursday evening, following the first day's session. The place was "Safety Hall," a large room in one of the carhouses set aside for a place in which to hold periodic safety meetings. Even here it was almost an entirely Louisville Railway affair, from a standard safety meeting dinner prepared and served by line and track employees, to the musical program developed from trainmen talent. If anything was evident at this dinner it was the fine spirit of co-operation and understanding that permeates the whole organization. Captain Evans, commander of the Great Lakes Naval Training Station, and his aid, Commander Ingram, were present and made very instructive talks on the Navy as an insurance. A third party in this local situation, where understanding seems to reign, is the people of Louisville, whose Mayor dwelled upon this desirable condition in his remarks at the opening session of the convention.

Departing from its custom followed for the past few years, the association decided this year to abandon the idea of holding the summer meeting on board ship while cruising the Great Lakes. Instead, the meeting place will be at Cedar Point, Ohio, on June 27-29. Thus the meeting will occupy only three days instead of a week as previously. A committee on arrangements has been appointed.

The first session on Thursday morning was opened by the address of Presi-

dent Samuel W. Greenland, Indiana Service Corporation, who reviewed briefly electric railway conditions in the central territory and urged greater initiative on the part of railway operators in spending money for bettering



S. W. GREENLAND Retiring President C. E. R. A.

service and for experimentation for new ways of making car riding more attractive to the public. His remarks, published elsewhere, were followed by a paper and discussion on the economic need of the one-man car and another on publicity.

REPORT OF SECRETARY-TREASURER

In presenting his annual report as secretary and treasurer of the association, L. E. Earlywine said that the membership comprises sixty-five interurban lines having a mileage of 5,371, four city lines, two lake steamer lines and 132 supply members. The assets on Dec. 31, 1922, were \$7,718.

The receipts of the midsummer meeting on the steamer South American more than covered expenses, netting the association about \$55. In addition to the regular committees, a special committee on rules and principles for safety and inductive co-ordination was active during the year. This committee co-operated with the Public Service Commission of Indiana.

The Central Electric Traffic Association held five regular meetings during the year and issued a total of seventy-five tariffs, including sixty-six joint excursion tariffs. The association is considering a joint party tariff for Ohio lines, a special baggage car tariff for Ohio lines, and a distance table and

station list for the association territory. Among other committees, that on motor bus and motor truck competition and the committee on public relations have been active in curtailing buses and trucks operating in competition with electric railways. This was done by educational work through farmers' organizations and civic bodies as to the damage caused by this mode of transportation and the cost of maintenance of the highways. New plates have also been made for the official interurban map, which is now in print.

The Central Electric Railway Accountants' Association held two meetings during the year, and a special meeting of officers and chairmen of committees was held also. A special committee is at work compiling data on freight costs with a view to arriving at a reasonable basis for determining the elements which enter into these costs. Excellent results have been secured from round-table discussions, during which inter-line difficulties were adjusted and accounting problems cleared up.

The Central Electric Railway Engineering Council has held two meetings during the year in general session, in addition to which the four sections have held a total of twelve meetings. At the sectional meetings the questions submitted by the general council have been considered and the results of the discussions given by bulletin to the member companies in the respective sections. The council has endeavored to secure co-ordination of the work of the sections by sending out questionnaires covering the subjects discussed. The Engineering Council has demonstrated its great value to the association.

During 1922 there were twenty-one meetings of the various bodies comprising the association, in addition to the meetings of the general Engineering Council, the executive committee and other committees. Marked progress has been shown in the development of freight transportation over association lines, and a number of new carriers have become party to the joint tariff publications issued by the association.

LATER SESSIONS AND ELECTION

The afternoon session was given over to the meeting of the Engineering Council in charge of Harry Reid, Indianapolis, Ind., chairman. Papers on the effectiveness of various means of making emergency stops, operation of light-weight interurban cars and on automatic substations were presented.

In his annual report as chairman of the Engineering Council, Harry Reid, president Interstate Public Service Company, Indianapolis, Ind., gave details of the meetings of the general council and the local sections held during the year. The former were held in Indianapolis

and on the steamer South American, while the meting places for the latter were Cleveland, Wheeling, Toledo, Louisville, Webster Lake, Indianapolis, Dayton, and Springfield. Some thirtyniae subjects were considered at the meetings. During the year questionnaires were sent out covering subjects under discussion, with fair results. In future copies of the questionnaires will be sent to heads of departments and to managers on each property. The need of the Engineering Council is greater co-ordination among the sections, which it is hoped to secure through general meetings of the entire council held in connection with the meetings of the C.E.R.A., through the general council itself and through questionnaires. Another subject of vital importance is standardization. The desirability of adopting the American Electric Railway Association standards as a basis, to be modified according to local conditions, is under consideration. Up to the present, all subjects discussed at the sectional meetings have been supplied by the general council. It is hoped that the co-operation of members may be secured in bringing out suitable topics for discussion.

On Friday morning the subjects of buses, motor trucks, safety work and franchises were treated in papers. Several of these papers are published elsewhere in this issue.

The final session ended with the election of officers for 1922. The nominating committee, of which Charles L. Henry was chairman, reported its selection as follows, the convention making the election by unanimous ballot:

President, James P. Barnes, president Louisville Railway, Louisville, Ky. First vice-president, Harry Reid, president Interstate Public Service Company, Indianapolis, Ind.

Second vice-president, Frank R. Coates, president Community Traction Company, Toledo, Ohio.

The following members of the executive committee were also elected: S. W. Greenland, R. I. Todd, A. C. Blinn, H. A. Nicholl, C. N. Wilcoxson, W. S. Rodger, F. W. Coen, J. F. Collins, M. B. Lambert, G. T. Seely, J. A. Donahey and E. O. Reed. As second vice-president of the association Mr. Coates has become also ex officio chairman of the C.E.R.A. Engineering Council.

ONE-MAN CARS

The first paper to be presented, "The One-Man Car an Economic Need" by Clinton E. Morgan, general manager Brooklyn City Railroad, was considered by everyone a most able discussion on the subject. Bearing out Mr. Morgan's contentions, E. M. Walker, general manager Terre Haute Traction & Light Company, Terre Haute, Ind., said that electric railway operation is essentially an economic problem. At first unit costs were reduced by increasing the size of the units at the expense of Increasing headway. However, the more general use of automobiles has introduced another element which

makes this kind of solution no longer practical. Mr. Walker said that in Terre Haute there are enough automobiles at the present time for the total population to ride in them simultaneously. When conditions became acute in Terre Haute Mr. Walker said the problem was approached purely on an economic basis. The introduction of the one-man car was made by using the man power available at that time to increase service. Immediately the earnings arose almost vertically to a new level. For the past three years there has been no appreciable change in car-miles and no more than a 1 per cent variation in earnings. He went on to say that total one-man car operation is now accepted by people as the conventional kind of electric railway service. As proof of this he cited the fact that no comments have followed the omission of the lettering from the car dashes saying that the car was of the one-man safety car variety.

In regard to collisions, he said there had been an increase over those of twoman operation but the greater number is attributed largely to the increase in automobiles from 4,000 to 10,000 in the past few years. Mr. Walker said the attitude of his men was the same as that indicated in letters written by employees and read by Mr. Morgan Each operator, being in complete charge of his car, has developed the "business-of-his-own" idea, and this conception of a car operator's job has reacted most favorably toward safe operation and courteous treatment of the public. In fact, Mr. Walker claimed that he now receives no complaints on account of discourtesy.

The one-man car experience of the Pennsylvania-Ohio Electric Company was related by Richard N. Graham, manager of railways. His discussion is presented elsewhere in this issue.

In regard to safety-car operation on the line of the Indiana Service Corporation, Fort Wayne, Ind., S. W. Greenland said that it had been impossible for him to tell the saving effected because of other changes made in operating practices at the same time. A 40 per cent increase in riding during the past year has also made any comparison difficult. However, he emphasized the importance of advising the public as well as the company's employees just what one-man operation means so that neither will think a saving is being effected in which they do not participate.

PUBLICITY DISCUSSED BY NEWSPAPER MAN

An interesting talk on the subject of publicity was then given by Arthur Krock, editor in chief Louisville Times, who said that the railway company which looks upon its affairs now as being a matter of private business might as well be running an ox cart from the Round Table to Camelot, for the chance it will have before a twentieth century public. Railway companies supply a necessity of modern life and have a right to live and to earn, but for this right

they should render good service to the public and exchange with the employees a comfortable living for loyal and efficient labor. The task of the railway executive today is to convince the public and the company employees that a railway company should pay a fair return on stockholders' money, as well as on workers' services.

Newspapers welcome all the actual news of a railway business which affect the capacity of the railway for public service, but the information to be acceptable must be news. Some companies have employed trained newspaper men as publicity agents. This is an excellent step, but the work of such a man should be watched. Any attempt to supply a newspaper with selfish items, designed to influence instead of to inform, is ill-judged and would bring upon the business a harmful reaction. Instead, the papers should receive real news for their news columns and sensible arguments for their advertising columns, and incredibly good results follow. Human interest items are what the papers want, as to how the companies are trying to better the conditions of their employees, what their safety records and goal are, who is the best dancer at the motormen's ball, the members of the crew against whom no complaints of discourtesy have been made, the reasons for the discharge of men, what tied up the line during the rush hour, the most amusing complaint ever received, did any woman ever forget her baby and remember her dog when she got off the car, etc. Answers to these and like things will interest the public, cost the company nothing and gain much for it.

Then there is another class of interesting information, in regard to the property, such as action by the board of directors, financial statements, forthcoming maintenance work and what it will cost, whether operating costs are going up or going down, etc. Often news which would otherwise be acceptable in the papers is held out because the space has to be given to a very important article on a national event. This condition should be recognized by the companies.

In the discussion which followed this talk, E. R. Kelsay, Toledo, Ohio, explained that misunderstanding is at the bottom of all difficulties in public relations. He claimed that the general manager is qualified to be the best publicity man, because, by being a good mixer, he can disseminate the correct kind of information. Knowing the value of constructive information, those in active contact with the management of railway affairs should grasp every opportunity to explain the comforts and improvements of their service. In this connection he urged that railway managers should make it easy for reporters to see them. It is possible, he claimed, to get good results from copy furnished by the national association, provided that it is rewritten and some local and humorous interest injected. Because of its appeal to human interest, he said that safety is the greatest adjunct of

publicity. In conclusion he summarized his remarks by saying that publicity is a game of being friendly.

Continuing the discussion on this subiect. W. H. Sawyer, president St. Louis & Suburban Railway, East St. Louis, Ill., expressed his faith in the good results of co-operating with newspaper men because they are the best informed people of a community and are the clearing house of facts and information. Publicity, he said, must be backed by performance, and good public relations are essential to successful performance. His experience has been that publicity is proper for what is being done or actually attempted, but not for what is going to be done. Because of the importance of this work every railway should have a publicity department to which the same study and supervision is given as to the transportation and engineering departments. Mr. Sawyer emphasized the fact that a hostile and lasting reaction will follow an attempt to broadcast insincere propaganda.

. COMMITTEE APPOINTED TO STUDY EMERGENCY STOPS

The paper on "Emergency Stops," by H. C. DeCamp (printed elsewhere in this issue), and the discussion following, resulted in the introduction of a motion to appoint a committee of five to study the sections in the rule books regarding the methods recommended for making emergency stops and to suggest revision of them according to information to be developed by tests. This motion was passed. In this connection, J. P. Barnes urged that a series of tests be accurately and elaborately made so that the results will be conclusive. Further, that the data obtained should be put in such a form that they are dependable and can be used as positive evidence in court. He also advised that the cooperation of the various state commisslon engineers should be obtained to lend official recognition to whatever decision is reached.

There seems to be no general agreement, even among railway men, as to the best way of making emergency stops according to H. A. Nicholl, Anderson, Ind. Some time ago trial runs were made on the Union Traction line to settle these diversified opinions. The method of argument was laid aside, and each man was allowed to make his stop in what he thought would be the quickest way. The result was it was found that a stop can be made in the shortest space with emergency air and sand. However, he said that the idea still persists in the minds of most people that reversal of the motor is the best way to stop the car, and it is exceedingly hard to convince a jury that applications of emergency air and sand were the most effective measures that could have been applied.

As a factor affecting the rate of braking, Prof. D. D. Ewing, Purdue University, said that the speed at which a car is traveling introduces a wide variation in the rates of retardation possible. He had computed that brake

equipment which would retard a car at the rate of 6 m.p.h.p.s. at comparatively low speed would retard at only about 1 m.p.h.p.s. at 60 m.p.h. S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio, suggested that an air brake man should be appointed on the committee, and this was concurred in.

LIGHT-WEIGHT INTERURBAN CARS

The next paper, that on the operation of high-speed light-weight interurban cars, by E. B. Gunn, Lima, Ohio, was printed in abstract on page 135 of last week's issue. In connection with a statement by Mr. Gunn that considerable trouble was at first experienced from nosing of the cars, C. E. Morgan said that nosing could be corrected by shortening the swing links on one truck and not on the other in order to break up the synchronism that occurs at a certain speed. Another effective method is to bring the links closer together at the top and separate them further at the bottom.

In answer to a query as to what the increase in receipts was due, Mr. Gunn answered that the increased business resulted largely from an hourly instead of a two-hourly schedule and because of the new, well lighted and ventilated equipment with comfortable seats and low steps. The seat covering is green plush and the seats themselves are spaced at 40 in. For the first nine months of 1922 Mr. Gunn said the Western Ohio Railway was operating at a loss of about \$4,000 a month and for the last three months, or since the introduction of the new light-weight cars, the revenue has been running about \$2,200 per month ahead. These cars were described in Electric Rail-WAY JOURNAL for Sept. 30, 1922, page 517. As a proof of the fact that the new cars and the more frequent schedule were responsible for the increase in business, Mr. Gunn cited the facts with regard to the Cleveland Limited business, a run on which the old cars are still in use. On this line he said that for the last three months there has been no increase at all.

Mr. Blinn Gives Data on Bus **OPERATION**

An extremely valuable paper on city motor bus operation was read by A. C. Blinn, vice-president and general manager Northern Ohio Traction & Light Company, Akron, Ohio. In this paper, which will be published in full in the February issue of Bus Transportation, the author gives the detailed cost of operation and maintenance, earnings, etc., and discusses at length some of the problems that have arisen in connection with the maintenance of buses in the city service in Akron, made severe by the frequent stops and the heavy grades. These conditions have developed the fact that the present day bus chassis is hardly equal to the severity of the work imposed upon it under Akron conditions. Mr. Blinn explained some of the special things that have had to be done as a result of experience, things which will greatly interest any electric railway man contemplating the use of buses.

Mr. Blinn's ideas about the possibilities of bus operation are indicated by the two or three paragraphs quoted herewith. He said:

herewith. He said:

Having gone through nine months of bus operation in the city of Akron, the service being auxiliary to the city system of the Northern Ohio Traction & Light Company, I stand today in the wilderness of transportation problems and wonder whether this Star of Bus-ism will yet lead us into the valley of despair or onto the road of success. I am not yet ready to subscribe to the growing theory that buses are indispensable in a city's transportation system, and most assuredly I am not convinced of their economy. It will take more than our experience to prove the advisability of using buses as feeders. I am more ready to agree that they are successful as a temporary substitute for a needed railway line into a partly developed territory.

I do not mean that we plan to curtail our bus operations. I do not say that we will not establish additional lines. In all human probability we shall continue our bus development. I am convinced that the public demand for bus operation is not substiding and I am just as firmly convinced that the public demand for bus operation company—the street railway—and not to an irresponsible operator. I subscribe to the belief that if the public actually wants bus transportation, the public ought to have it, but the public should pay the cost and that cost must embrace full redemption of the investment.

After discussing the manner in which data are being sought, and giving the cost figures as found to date, Mr. Blinn went on to say:

The figures and records will, undoubtedly, enable us in time to reach definite conclusions as to the value of different pieces of material and apparatus. They will, we trust lift us from the wilderness and show us the road, whether that road leads up into a land of buses, or whether it takes us back to the field of exclusive electric railway service.

For the present, we can only say that we

way service.

For the present, we can only say that we know the buses cost more to operate per passenger carried, that they will not handle the crowd, that they are less reliable, that they really move no faster, that they are more flexible, and that in spite of the crowding, poor ventilation and harder riding there is a popular clamor for them that must be met, and met by the established street railways.

But of the future—oh, that we could look

must be met, and met by the established street railways.

But of the future—oh, that we could look with wisdom through the years that lie in waiting. Who knows but the public demands of today may again swing to the modern electric car, carrying to the scrap pile the vast investment now going luto the passenger bus. Already along the paved streets of our own city come murmurs from the people who depend upon us for transportation, that the bus will only do in an emergency. We can only move with care lest we find a dangerous place in this bus pathway that may enmesh us in the tangled transportation web of financial loss. Therefore, I repeat, just as the public demands bus transportation, just so it should be furnished by us, but just so must the oubl'c pay the full cost, including amortization of the investment.

The twenty-four buses operated in Akron are operated as a part of the city railway system, the same 5-cent fare and universal transfer applying to buses as to cars. On this basis the per cent of operating cost to gross revenue for the nine months has been 98.89 as compared to 86.82 per cent for the street cars. The total earnings per bus-mile were 24.53 cents as against 33.12 cents for the railway. The average speed was 8.49 m.p.h. as against 8.8 m.p.h. for the street cars. The outstanding item of expense to which attention was directed was that for maintenance, which amounted to 1.12 cents per passenger carried for buses as against 0.41 cents for the street cars.

The maintenance was divided up thus: 14.8 per cent of the gross revenue for chassis maintenance, 2.52 per cent for body maintenance, 6.15 per cent for tires and 0.63 for miscellaneous. The depreciation allowed was 2.35 per cent per month for the buses as against 0.5 per cent for street cars. The operation for the nine months has resulted in a gross revenue of \$78,253, giving a loss of \$12,928 for the period.

The only discussion on buses was some further information added by Richard N. Graham, in regard to the interurban buses operated by the Pennsylvania-Ohio Electric Company. He stated that a license fee \$50 per bus in each of four cities reached was charged so that the total of \$200 per bus must be paid annually in addition to the state license. All the cities require a \$25,000 liability insurance, but a \$75,000 policy is carried by the railway on its buses and even then the premium is considerably less than the cost of accidents on the electric lines. In connection with earnings, he said that the gross each month had been about 34 cents per bus-mile.

DON'T MINIMIZE SAFETY WORK

A paper on "The Safety Chairman and His Duties" was then presented by N. W. Funk, safety chairman Louisville Railway. It will be published in a later issue of this paper.

issue of this paper.

Bearing out Mr. Funk's contention that the idea of safety should be sold to the people and that the railway safety officials should co-operate with the local council, Mr. McClain, of the Louisville Safety Council, added that there would never be a finer opportunity to dispel old ideas in the public mind about the traction lines than by showing a sentiment toward safety work. This work reflects the pulse of the public's attitude toward a company. In concluding he urged that every company should make the man in charge of this work responsible to the president or vice-president.

MR. HUMPHREY TALKS ON FRANCHISES

Churchill Humphrey, assistant general counsel Louisville Railway, then made a very interesting talk on the historical antecedents of the present day regulatory franchise. He showed that the origin of the franchise grant dated back to the time whereof the memory of man runneth not to the contrary, and that it was, in its carliest form, a grant of a privilege on the part of a king, usually very profitable to the king. Mr. Humphrey predicted that the common fixed-rate franchise will disappear within our lifetime and that all utilities will operate on a permit extending indefinitely as long as the utility performs its service properly. He concluded his talk with a statement of his view of the relation of the utility to the government, saying that it is one of service but not servility.

M. B. Lambert, Westinghouse Electric & Manufacturing Company, on behalf of the committee on education of American Electric Railway Association,

sent a message to the Central Association, urging that the executives and department heads give serious consideration to the great importance of promoting education among electric railway employees on a brond basis. He emphasized the fact that in many instances the principal problem in this connection is to educate the executives on the value of education.

W. H. Sawyer, East St. Louis & Suburban Railway, and fourth vice-

president American Electric Railway Association, also brought a message from the national association on cooperation between the national association and the sectional associations and between different sectional associations. He pointed particularly to the mistake he believes is being made in that the information compiled by the national association is not being fully utilized. He urged the sectional associations to capitalize upon this also.

Railways Must Take Bold Action in Studying Their Problems*

Bolder Gambling with New Expenditures for Increasing Service and More Radical Experimentation Are Recommended by S. W. Greenland in His Annual Address

I T IS a bit difficult to attempt a review of the traction situation for the year 1922. The hardships during the war which all of our properties suffered left their marks so strongly that we are sometimes unable to see just what has been happening in the meantime. If these troubles have helped us to get across the single idea that there can be no fixed selling price for any electric railway ride, I think they have been worth while and I believe that idea is across with the majority of our public. It now remains for us to measure up to this changed condition.

We have talked so much about service that it is up to us to produce the goods; first to justify the increases we have had, and second, because it really does pay to give good service. It is my belief that the public is so fully sold on getting real service and being willing to pay for it that it is time for us to be somewhat bold about gambling with new expenditures for this service. If this means for the larger systems the building of the much-needed extensions and the double-tracking of certain lines, new cars of front-entrance and center-exit type, augmented by firstclass one-man cars, and for the smaller systems good one-man cars with the use of electric switches, and independent crossing watchmen, these things should be done.

The possible variation in fare offered by the weekly pass, which may be adapted in price to fit the particular local conditions, employment of extra street collectors to assist at the busy loading points during the rush-hour periods, employment of more inspectors for determining turn-back service, and in fact a general revamping of our ideas that a thing could not be afforded, in my opinion, is going to be necessary if these higher-fares are to be continued.

I do not mean, of course, that all of these things can be done at once or that all of the important extensions which some of our political friends would like to have us make can be made even within the next few years. I do mean that our fundamental viewpoint that we are a mistreated, broken-down industry, suffering from the inroads of competition of the new economic factor—the automobile—plus the unreasonableness of our public officials, must be forgotten altogether.

I was very much pleased with the attitude taken by the national association on these various points at the annual meeting in October. For instance, it was only two or three years ago when we were short-sighted enough to still view the possible bus and truck competition as a bugaboo, which should not be allowed or should be fought in the old fashioned cut-throat and legislative manner. The new view-that what we are really selling is transportation, whether it be a 5-cent or a 50-cent ride, must fully obtain, if we are going to serve our various communities. If the bus is to have its place in both urban and suburban service and the auto truck in freight and express service, we should be in the business of operating these buses and trucks.

This does not mean that we should not help in our legislative body to have these vehicles pay their proportionate share of taxes for the use of the high-ways, which are built out of general funds. We should remember, if this is a service that is necessary and we are attempting to serve the complete transportation needs in our territory, that any unfair burden which we attempt to place on this class of service now will be with us when we take this larger view of selling transportation.

It may be that there are almost no economic distances where either passengers or goods can be hauled more cheaply with the motor car of some description. While from our investigation, particularly of the rural bus lines, we are not enthusiastic as to the moneymaking possibilities of some of this service, it may be that this more convenient and more flexible service can be rendered at a rate which will support it. In any event, I believe that it is our duty to study this situation carefully, not only on paper, but to make some investigation and some experiment toward proving what can be done

^{*}Abstract of presidential address read at annual meeting of Central Electric Hallway Association, Louisville, Ky., Jan. 18 and 19, 1923.

with this new form of flexible transportation.

As far as city lines are concerned, we are convinced that with proper work the public is willing to pay rates where city lines can be put on a self-sustaining basis.

My view, I regret to confess, on the interurban situation is not quite such an optimistic one. Practically all of the roads with which I am acquainted have had a very pleasant increase in business in 1922, just enough to overcome what has rapidly been crystallizing into a strong belief that perhaps after all the interurban lines were an economic luxury rather than a necessity. Here, again, I believe that if this class of our service can be pulled out of the fire at all it can be done only by the aid of some rather bold action. Most of us are operating the same old cars with which we started some fifteen or twenty years ago. With the heavy, stiff-riding car, dark as to lighting, often narrow as to seats and short as to leg room, we must really admit that we have not made much of a bid for this traffic, except in frequency of schedule and the fact that we land our passengers in the center of the city.

There has been considerable development toward the lighter weight interurban car of easier access, really better riding qualities even with reduced weight and more comfortable seating space. The splendid saving afforded by the power reduction in the use of these cars is a first-class incentive toward their purchase. The real additional incentive, I believe, however, should come from our desire to furnish a better lighted, better ventilated and generally more comfortable vehicle in which to haul our passengers. This kind of a car with increased service and publicity, which will indicate that we do not think that we are going into our grave, but are furnishing the quickest, most comfortable method of intercity transportation, will come close to solving our passenger problem on the interurban lines.

The freight business on our interurban lines is considerably more of a problem. We have been attempting to segregate our cost for freight and express business so we can tell something about what profit we are making on this portion of our service. On our own system there appears to be a very meager amount left over operating expenses to apply as return on investment. It is true, however, that we have assigned a fair proportion of maintenance and overhead charges in computing the cost of this service, which charges we could probably not dispense with if the freight and express service were discontinued. This means that the net result of operating freight business is better than our actual cost analysis showing. principal item of cost, which cost must be reduced, is the handling at the terminal. I believe that a study of this association of terminal costs of freight business with a view to co-operating to

reduce them would be a very desirable work for the association members

I think that the inherent difficulties of hauling four or five-car trains through our city streets will soon become an important factor in determining what can be done in the freight and express business. Our various franchises over the territory covered by the properties of the association's members are different in this respect as in most others. We cannot expect to be allowed to haul through residential and business districts long trains of freight cars without arousing the antagonism of the public we serve.

This is, of course, a problem for each local company, but inasmuch as through business is getting to be such an important factor in our freight service and in the end is a very

profitable portion of our business, I believe that it is wise for us to take a broad view of this problem. The difficulties which any one of our member companies may encounter will have their immediate effect on through business from connecting lines and in the end have its final effect on public opinion in the other communities.

I think, however, this is just the time when we should not be carried away with too much enthusiasm, but we should continue to study our problems and make experiments with a somewhat bolder front than we have ever done in the past, practicing the rigid economies that we have learned so well in the past and at all times keeping before us the fact that we are assisting to a greater degree than any other agency to build up the communities and the territory we serve.

The One-Man Car an Economic Need*

Statistics Show It to Be Safer than Two-Man Cars, Preferred by the Employees, and a Real Contribution to Railway Development

BY CLINTON E. MORGAN Vice-President and General Manager Brooklyn City Railroad

In ANSWER to a recent questionnaire sent by the American Electric Railway Association to companies using one-man safety cars 109 replies were received and give very interesting figures as to the results obtained by the use of this type of car as compared with the two-man type. They are shown in the accompanying table.

ACCIDENT DATA PER 100,000 CAR-MILES BASED ON REPORTS FROM 109 COMPANIES

			of One-
			an over
	With	With	Two-
	One-	Two-	Man
	Man Car	Man Car	% 29
Number	. 32	4.5	29
Cost	\$7,541	\$10,699	34
Personal injuries. Collisions with	44	83	47
other vehicles	196	207	5.17

To the question put to these same 109 companies, "Have you had any accident which could be traced directly to the fact that the cars were operated by one man only?" seventy-eight companies reported "No" and six companies reported "Yes." Twenty-five companies did not reply to this question. In all cases, the six companies reporting "Yes" also stated that these accidents were due to the failure of the operator to obey the rules of the operating company, which again brings in the human element.

Electric street cars are safer and, with one-man operation, more economical to a community (taking paving and street congestion costs into consideration) than any other developed mode of mass transportation. Hence, it is an economic error to oppose one-man safety cars. If the principle that more than one man is desirable on a safety

car equipped with power brakes and safety devices is sound, the same principle should equally apply to the automobile, particularly to auto buses and trucks, that is not so equipped.

Approximately 11,500,000 motor vehicles are registered in the United States, of which, we will say, 9,300,000 are in daily use. Are any of these vehicles equipped with safety devices similar to those found on the one-man safety cars? Will one of these vehicles stop with brakes applied and sand on the track or roadway and make the stop in emergency if the operator takes his hand off the steering wheel or his foot off the control apparatus? The obvious answer is "No," but in the case of the one-man safety car the equally obvious answer is "Yes."

This is another of the many reasons for the advancement of the one-man safety car, and it should be impressed on those who, for some reason, stand in the way of this economic necessity.

These one-man safety cars of the lighter type were first applied to the thinner lines of traffic, particularly in the outer parts of the cities, where traffic, both automobile and street cars, moved at a higher rate of speed. This led to a slight increase in car collisions with other vehicles, and accounts for the small reduction of 5.17 per cent in such accidents. It must be borne in mind, however, that we have an ever-increasing number of automobiles, many of which are operated by inexperienced drivers.

The reason for the success of the oneman safety car is the improvement in service to the car rider, freedom from boarding and alighting accidents and a general reduction in accidents, all of which have brought about increased riding by the public. Further advantages have been found in the lowering of maintenance costs, reduction of labor

^{*}Abstract of paper read at the meeting of the Central Electric Railway Association, Louisville, Ky., Jan. 18-19, 1923.

costs, reduction in power costs and acceleration of car speeds. In this connection it should be noted that the expenses incurred in producing the car ride is paid by the car rider. These costs include street paving and taxes, which have also increased abnormally in the last decade, and in the end the car rider is the one who suffers from lack of adequate service if the fare does not meet the cost of service.

If the railway companies are in a position to produce the car rides for the price paid by the car rider, then they are in a position to furnish adequate service. Likewise, it is an economic necessity that the railroad company produce this ride at the lowest cost possible. The natural result of improved service with more frequent headway is less crowding, higher speed and more comfort given by the one-man safety car. New designs of lightweight, large double-truck cars with double passageways are being developed with provision for operation by either one or two men. There is an unquestioned demand for this type of car in congested city service, where the use of two men will facilitate the handling of the peak rush-hour loads more satisfactorily and permit provision that during the off-peak riding these same cars shall be operated by one man, thus producing one unit that can be used during all hours of the day. Savings clearly result, for there are very few cars operated between 8 p.m. and 6 a.m. that take in enough money to pay the men operating them, let alone the payment of the other costs such as power, maintenance, etc.

We must not lose sight of the fact that the electric railway, like every other manufacturer, has overhead expense. In spite of everything, this cost is ever present. If the manufacturer is to succeed he must use his plant and make it earn steadily and consistently. This also applies to the transportation companies, as the car rider is vitally interested in this overhead cost. As the public becomes educated to the benefits derived from the use of the one-man safety car, I predict that it will demand a further application of this principle, not only to the street railway service but to heavier transportation such as subway, elevated, interurban and suburban lines.

With the introduction of these cars in Brooklyn, we have more than shared with the public the savings brought about by their use, and in many cases we have increased the service with the installation of these ears from 50 to 100 per cent; some, however, only 10 per per cent and others 20 and 30 per cent, depending upon the conditions surrounding the traffic requirements of each line. The public in general has responded to this increased service by increased patronage and from investigation I feel that with the adoption of this type of car there has been an average increase in service to the car riders of approximately 30 per cent on the street railways throughout the country. This policy is also being applied to the subways of New York City, where a ten-

car train can now be handled by one guard in addition to the motorman, and many such trains are operated with one guard handling three or more cars. All of this has been done with no let down in the safety of operation.

In some local communities numerous difficulties have been created by misguided political, civic or labor leaders, a few honest in their convictions, but erring in judgment through unfamiliarity with the facts and through prejudice

inspired by other motives.

From the standpoint of employment, I can say for the Brooklyn surface lines, and I think that the same condition prevails throughout the industry, that there has been no case in which even one motorman or conductor has been laid off or retired from service as a result of the introduction of the one-man safety car. In fact, today we are short approximately 150 men to bring our force of car operators up to normal operating strength. We have in Brooklyn 256 one-man safety cars in addition to 175 ears designed for one-man-two-man operation, making a total of 431 safety cars. With us the runs to which the one-man safety cars are assigned are now regarded by the men as the preferred runs, not alone on account of the operators receiving 5 cents per hour more than the rate paid those working two-man cars, but on account also of many other advantages clearly shown in statements made by employees. Two of these statements I quote:

I have been in the employ of the various companies comprising the Brooklyn Rapid Transil System for the past eighteen years and during my term of employment, having operated all types of cars, do hereby certify that I have been operating the standard type of one-man safety car for over two years and can truthfully state that I now prefer operating a safety car more than the old type two-man car.

My reasons for preferring the safety car is that the safety car is directly under your own control, and your ability to move over the road on schedule is not governed by the actions of the conductor on the rear.

I do not feel any ill effects from operating safety cars and the work involved is not any more than can be safely handled by one

any more than can be safely handled by one

Personally, I feel that I could operate any size car having safety car features on any line regardless of the traffic carried, and still run on schedule.

Another:

I have been in the employ of the various companies comprising the Brooklyn Rapid Transit System for the past ten years and during that time have worked as motorman and become familiar with the various types of ears used on street surface railroads.

Since last February I have been operating a double-truck car on the Sunner Avenue line which was reconstructed with safety car features for one-man operation. I can truthfully state that I like working a safety car hetter than the old type of two-man car. The work keeps my mind occupied and I now feel a lot better upon completion of my day's work than I did when working as a motorman only.

The work involved is no more than can be safely hundled by the average man, and the car appeals to a man who wants to do his work properly for the reason that he is whelly responsible for the way in which the car is operated and he is his own boss. From personal contact with the men at the depot, I have come to the conclusion that those who object to safety car operation are the lazy fellows who want to get full pay for doing as little work as possible.

This general sentiment is expressed by the other car service employees.

Summarizing the one-man car situation, as gathered from the decisions of various utility commissions throughout

the United States, it appears that this type of vehicle, although opposed at first as an innovation, has rapidly grown in favor as improvements in safety and service appliances have been made. It appears also that, while the two-man car may be desirable in places where traffic is heavy or other local conditions make the presence of two men desirable, the one-man safety car will not only continue to fill an important place in railway operation but the further development and application of this principle, embodied in the one-man-two-man type of safety car. has established a further means of providing more frequent service to the car rider as well as aiding in the solution of serious financial and economic difficulties of the electric railways and the ear-riding public.

One-Man Car Operating Figures from Youngstown*

BY RICHARD N. GRAHAM Manager of Railways, Pennsylvania-Ohlo Electric Company, Youngstown, Ohlo

Pennsylvania-Ohio Company operates three interurban lines radiating from the city of Youngstown. At the terminus of each of these lines are located comparatively small communities in which city operation is conducted. These communities are New Castle, with a population served of about 60,000; Sharon, with a population served of about 40,000; and Warren, with a population served of about 30,000. One-man operation was commenced in September, 1918, and the number of one-man car-miles in the three communities has increased from 15,000 in the month of December, 1918, to 188,000 in December, 1922. At the present time only one line in any of these communities is served with twoman cars. In December, 1918, there were seven one-man cars operated. In December, 1922, there were forty-two. The total passenger revenue in these towns in December, 1918, was \$53,136; in December, 1922, \$69,025. The manhours operated in these towns in December, 1918, were 43,266, and in December, 1922, 26,395. The revenue per man-hour in December, 1918, was \$1.23; in December, 1922, \$2.62, making an increase of revenue per manhour of 113 per cent. In noting this increase of revenue per transportation man it must be taken into consideration that the average fare in 1918 was less than 6 cents and in 1922 about 7 cents. but the fact that with an increased revenue there was a reduction of nearly 40 per cent in man-hours certainly illustrates the efficiency and economy of one-man ears.

In addition to forty-two standard Birney one-man cars operated in these communities, we are operating a number of rebuilt double-truck cars, which have been fully equipped with Hirney safety devices and are operated with one man. Of course the use of the

^{*}Discussion on C. E. Morgan's paper, "One-Man Car an Economic Necessity."

Birney lightweight car has resulted in operating economies even more pronounced than the reduction in man power. In New Castle, a great deal of our track is twenty years old and in the course of paving operations it would be necessary to install new track if the old and heavy equipment were to be used. With the light Birney cars it is entirely practicable to rehabilitate the track where new paving is done and thus avoid very large capital expenditure.

In Sharon, with the continued use of the large car with an increase in car mileage, it would have been necessary to install new substation equipment, which need was removed by operation of the Birney car.

For the year 1922 the cost of lubricating, repairing and inspecting all safety cars amounted to 1.7 cents per car-mile, which is about 60 per cent of the same cost of two-man equipment in use. In all our communities served by the Birney car they are favored by public opinion and the extension of their operation has been made with the full co-operation and consent of our

I have reserved for the last word our experience in accidents. In 1918, including our interurban lines, our accidents were as follows:

New Castle Sharon Warren							64	$1922 \\ 12 \\ 34 \\ 25$
Total								71

The reduction in the total number of accidents was exactly 50 per cent. Since during these years we have carried on consistent and elaborate prevention work, we do not pretend to say that this improvement was due to oneman cars, but with this record in view we are absolutely certain that the use of one-man cars has not added to our accident hazards.

The Use of the Interurban Bus*

By Installing a High-Grade "Coach" Service Between Youngstown and Warren the Pennsylvania-Ohio Electric Company Has Killed Bus Competition and Built Up a New and Increasing Traffic

BY GARRETT T. SEELY Vice-President and General Manager the Pennsylvania-Ohio Electric Company

THE Pennsylvania-Ohio Electric Company has for many years operated a 15-mile suburban line between Youngstown and Warren, following the main public thoroughfare alongside the Mahoning River. The line for its entire length is situated in the heart of the steel manufacturing district and extends through a large part of Youngstown, Girard, Niles and Warren. Of the total length of 15 miles, 11.4 miles is on city streets, the distances on city streets being as follows: In Youngstown, 3 miles; in Girard, 1.7 miles; in Niles, 3.7 miles, and in Warren, 3 miles.

In the short distances between cities, the electric railway is on the main highway and none of its length is on

private right-of-way.

Youngstown has a population of approximately 140,000, Girard nearly 10,000, Niles 13,000 and Warren 27,000. The electric railway line throughout its entire length, with the exception of a short distance in Warren and 3 miles in Youngstown, is single track. In addition to the disadvantage of having so large a part of its route in city streets, the electric railway line describes a circuitous loop through the business district of Niles.

A regular all-day headway of twenty minutes is maintained on this suburban line from Youngstown to Warren. On the same track, there is a shorter suburban service operated to Girard on a twenty-minute headway, thus furnishing ten-minute service to Girard. From the terminus of the line in Youngstown to the city limits of Youngstown, a

*Abstract of paper presented at annual meeting of Central Electric Rallway Association, Louisville, Ky., Jan. 18 and 19, 1923.

Pennsylvania-Ohio Electric route distance of 3 miles, a frequent service is given by the Youngstown Municipal Railway with safety cars. As a result of the large proportion of single track, large proportion of the line in city streets, frequent through service and additional service to Girard and the city limits of Youngstown, the through service from Youngstown to Warren and from Warren to Youngstown is slow, the service between the two cities being given by seven cars on a headway of twenty minutes and one hour and ten minutes for the trip.

WHY THE COACH SERVICE WAS INAUGURATED

There has been a persistent demand for quicker service between these communities. The Erie Railroad parallels the electric railway and, on account of the frequent through service between Pittsburgh and Cleveland by way of these cities, is to a certain extent in competition with the Youngstown, Niles and Warren electric railway line. A great deal of the local travel in the valley avails itself of the steam railroad facilities. The steam trains make the trip from Youngstown to Warren in thirty-five to forty minutes.

In March, 1921, bus competition commenced on this line and gradually increased. Several makes of buses were used. The fare on the buses ranged from 25 to 40 cents. That on the electric railway from Youngstown to Warren is 30 cents, with a 10-cent intermediate fare between towns, fourteen zone tickets are sold for \$1, three being good between Youngstown and Warren and making the through fare 22 cents with tickets.

The buses made the trip from Youngstown to Warren in approximately 50 minutes, twenty minutes less than the electric cars. This not only diverted traffic from the cars, but increased the riding habit between the communities. These buses were, however, more or less noisy and inconvenient; the schedules were poorly adhered to; the drivers were not uniformed or markedly courteous, and, in general, the bus service, given as it was by a large number of independent parties, lacked discipline and responsibility.

To compete successfully with the buses and prevent further interference with electric railway patronage required that the running time of the cars be reduced. The expense of doing this would have run to a million dollars, and even then the limited service possible after such expenditure would be given subject to such disadvantages of franchise provisions as to stops as would slow up schedules and this at low rates of fare.

As limited service could be given with gasoline cars with very much less original expenditure, without restrictions as to stops that would destroy efficiency, and with fares that could be fixed to pay the cost of services, it was determined to give this limited service. For this purpose it was decided that vehicles should be secured in which there was abundant room for all passengers to sit comfortably, which would be attractive and clean, which would be free from mechanical noises, which should run strictly according to definite schedules and in which the passenger would not have to scramble for a seat. This decision was made in January, 1922, and service was inaugurated on Aug. 1, 1922.

THE ENGINE SPEED WAS KEPT DOWN

The White Model 50 bus chassis was adopted, but with a modified straight bevel gear, single reduction rear axle with gear ratio of 4.25 to 1. This axle was adopted because, as the 15-mile trip was to be made over a good road with very few stops and without heavy grades, its adoption cut down the engine speed at the usual traveling speed of the vehicle, thus reducing wear and tear on the engine and body and reducing vibration. Through collaboration with the Bender Body Company of Cleveland, a limousine type of body was developed, seating eighteen passengers on cross seats. The driver is separated from the passengers with a glass screen as in the ordinary type of passenger limousine, and all passengers have plenty of elbow and leg room. The seats are beautifully upholstered in a special variety of embossed leather, which is exclusive with the Pennsylvania-Ohio vehicle, and the fittings of the limousine in the way of carpets, curtains and other accessories are of the highest class.

To distinguish the new vehicles from the often forlorn and decrepit-looking vehicles called buses they are called coaches. While the coaches were being manufactured an intensive advertising

campaign was carried on throughout the entire territory of this company, calling attention to the coach service that was being inaugurated.

A half-hour headway was decided upon and five coaches built, four for regular service and one to serve as a spare. In the meantime, drivers were selected and trained, the original selection of seven drivers being made from 239 applicants. A chauffeur's uniform of gray whipcord was selected and a cap bearing the insignia "P-O." Each driver was provided with two suits so that the uniforms could always be kept neat.

FARE FIXED IN ACCORDANCE WITH QUALITY OF SERVICE

The fare between the terminal cities was fixed at 45 cents, double the ticket fare on the electric railway and higher than the fare of the opposition buses. The service was successful from the start. By the first day of October, the opposition buses had disappeared from the field. The receipts from the coach lines since the inauguration of the service have been as follows: August, \$8,986; September, \$9,283; October, \$12,580; November, \$11,329, and December, \$13,707.

Immediately after service started, two additional coaches were purchased for this line; in October, three coaches were purchased for similar service on another line of the company, and two additional coaches purchased in November brought the fleet up to twelve coaches.

The business of the bus operators previously on this route was from 25 to 40 per cent less during the cold months of the year than during the warm season. This is not true with the coach service, although the spring business will probably be greater than the present business. Now the service is on a 15-minute headway from 12 a.m. until 6 p.m., on a half-hour basis in the mornings and on a twenty-minute basis in the late evening. On Saturdays, Sundays and holidays the service is fifteen minutes throughout the greater part of the day.

Ticket offices are maintained in both Youngstown and Warren and ticket sales are limited to the seating capacity of the coach. Tickets are on sale at all times in advance for any trip. At both terminals a seat chart is maintained for each trip during the day, and all tickets are stamped with the leaving time of the coach. Unused coach tickets are redeemable at any time at any ticket office of the company. During December, the ratio of receipts to possible receipts was 50 per cent; that ls, if every seat on every trip had been paid for, the receipts would have been double the actual receipts secured.

THE COACH BUSINESS IS LARGELY NEW TRAFFIC

As to the effect of the coach line upon the electric railway line, the following figures are of interest: The receipts from the Youngstown-Warren electric railway line for December. 1922, were \$30,632, which was an increase of \$43 over December, 1921. This company operates two other suburban lines of approximately the same length as the Youngstown-Warren line. On one of these, the receipts for December were \$1.098 more than the year before, and on the other \$1,150 more. The Youngstown-Warren line could, therefore, reasonably have expected from \$1,000 to \$3,000 in December. Evidently, then, the coach business created a new traffic, representing in excess of \$10,000, or 33 per cent increase over existing traffic. A limited street car service would hardly have produced such an increase.

Many of the patrons of the new service are women, in a large number of cases representing families which own automobiles. Many are officials of industrial concerns who prefer the coach service to using their own cars on a crowded highway and being compelled to find parking space. That the coach service has developed interchange of traffic between cities is indicated by the fact that the large stores in these communities in their advertising stress the fact that the coaches stop at or near their stores.

There is no prejudice against the company for furnishing this transportation; in fact, its permanence and responsibility attract patronage.

Our original installation of tire equipment comprised 36 x 6 pneumatic tires carried on Budd Michelin disk wheels with dual wheels in the rear. None of

the rumored disadvantages of dual wheels has developed in practice, the wear on the tires being very uniform. After five months of operation we can expect an average mileage of near 20,000 per tire with 36 x 6 tires in our service.

We have changed several of the coaches to 34 x 5 tires with good results. We have had few delays or interruptions to service on account of tire trouble, and only two or three cases of puncture on the front wheels. In case of a puncture or other trouble on one of the tires on the rear wheels, the vehicle can run on the other tire to the terminal, where the wheel can be changed.

Until severe cold weather set in, we were getting about 8 miles per gallon of gasoline. In order to keep the vehicles comfortable during the cold season the engines are allowed to run con-

tinuously. This cuts down the mileage per gallon of gasoline, but we do not need to use wood alcohol or other antifreeze solution in our radiators.

Our public is outspoken in praise of this coach service, and the giving of the service by our company has improved our public relations in all the communities served by the coaches. The feeling on the part of the public es a whole is that the company is making every effort to give the maximum possible transportation service and it shares with the company a natural pride in a rather unusual transportation venture.

Marketing Your Own Commodities*

The Fundamental Idea Expressed Is that When Transportation Which Should Be Provided by the Electric Railway Is Furnished by Other Agencies, the Latter Are Not "Marketing Their Own Commodities," but Another's

BY R. H. WYATT

General Superintendent Louisville & Interurban Railroad, Louisville, Ky.

T was my privilege recently to ride I was my privilege recently over the property of the Kentucky Traction & Terminal Company, which serves the Blue Grass section. section is noted throughout the United States for its beauty and for its fertility of soil. In such a community there is a large volume of commodities to be exchanged and transported between the producer and the consumer. It is the mission of the transportation company to perform that service, but in this, as in many other localities, the service is being performed either by the trucks of the merchant or by some truck company which parallels the lines of the transportation company for many miles. Thus the business of the transportation companies has been reduced to a great extent. One-man freight cars are being operated on this particular property, so light is the traffic. This is a case of a merchant marketing, as a side line the commodity which justly belongs to the transportation company.

The truck operator, whose right-ofway belongs to and is paid for by the public, will doubtless quote rates which compare favorably with those of rail lines, and the shipper will freely accept the service, believing that he has a "snap." However, when he adds to his freight bills his road tax and his road repair bills, which are greatly increased by reason of truck operation for private gain, then the shipper will possibly realize that his freight bills are not what they seem.

Coming closer home, I will give you a local experience. Some time ago, one of our largest manufacturing plants purchased a fleet of high-class motor trucks to distribute its products throughout adjacent communities. Until that time the firm had been one of the largest customers of the local transportation company.

When the new delivery service was brought to our attention, we immedi-

^{*}Abstract of paper presented at annual meeting of Central Electric Railway Association, Louisville, Ky., Jan 18 and 19, 1923

ately dispatched our freight solicitor to ascertain the cause of this development. Upon gaining an audience with the traffic manager, our representative asked if it was rates or the lack of service that prompted the large expenditure of money by his company to enable it to perform a service which had hitherto been handled by our company. The traffic manager replied that both rates and service had been entirely satisfactory and admitted that the truck deliveries would cost more than

those by traction. His company, however, had concluded to try the delivery of its own commodity as an advertising campaign. This is the case of a mercantile business marketing, as a side line, the commodity of the transportation company.

As to truck transportation, I do not intimate that it has no field. As a feeder of rail lines it has a big and profitable field; but this field is only as a feeder and not a competitor of the

railways.

Full and Semi-Automatic vs. Manual Operation for Substations*

A Statement of the Principles Involved, Showing that the Interurban Railway Application Is Simpler than the Urban, but that Labor, Feeder Copper and Incidental Savings in General More than Offset the Fixed Charges on the Additional Investment

BY CASSIUS M. DAVIS
Railway Engineering Department,
General Electric Company, Schenectady, N. Y.

AUTOMATIC and semi-automatic substations were introduced primarily as a means of conserving labor. They have lived up to expectations in this respect and have given a good account of themselves from an operating point of view. They offer a new economic means of effecting many improvements in operation in addition to the reduction in labor expense. Schedule speeds can be increased at a minimum expense, improvement in distribution and conversion economics are made possible, additional capacity for new load centers can be provided in a most economical manner, etc.

The purpose of this paper is briefly to present some of these principles, none of which is new, and to suggest their application in making a comparison between manual and automatic control.

There are several important differences between interurban and city systems, primarily because the interurban represents essentially a lineally loaded system while the load on a city system is distributed over an extensive area. A single substation on an interurban system usually feeds only a given length of a single route, while in the city one substation may feed portions of several routes and the length of feed is indefinite.

AUTOMATIC CONTROL FOR INTERURBAN SYSTEMS

On the average interurban railway the cost of the labor conserved by the use of automatic control is considerably in excess of the fixed charges on the additional equipment. This applies to both single-unit and two-unit substations, although, of course, to a lesser extent in the two-unit case. Automatic control for a single-unit substation yields a gross return of from 25 per cent to 40 per cent on the invest-

 Abstract of paper presented at annual meeting of Central Electric Railway Association, Louisville, Ky., Jan. 18 and 19, 1323

AUTOMATIC and semi-automatic substations were introduced primarily as a means of conserving labor. They have lived up to expectations in this respect and have given a good stantial saving in feeder copper.

Where it is necessary to improve the voltage conditions on the trolley, balance can be struck between the fixed charges on the necessary additional copper and the annual operating expenses of additional automatic substations to accomplish the same result. The result is frequently greatly in favor of the substations. For example, as against \$650,000 in feeders the desired end is obtained on the North Shore line by the use of automatic substations for about one-quarter this amount. The fixed charges on the substations would come to only about one-third those on the feeder copper.

As an advantage incidental to the use of automatic substations the track drop will be reduced and the distribution efficiency increased. This has a bearing upon the mitigation of electrolysis, which is of greater importance in city service than on an interurban line.

There are two features in the control itself which must be borne in mind when considering the economics of substation location, first the load limiting resistor, and second the possibility of shutting down during light-load periods.

The resistor performs the three-fold function of replacing the ordinary overload circuit breaker, limiting the output of the substation and transferring part of the overload to adjacent substations, all of particular importance in interurban service. The functioning of the equipment makes each substation a reserve for its neighbors and thus becomes an important factor in the selection of the size of substation equipment. There are some 500-kw. units now in operation which, under manual control, would be entirely inadequate and would have to be replaced by 750-kw. or 1,000kw. units.

As to the second feature it is possible to adjust the control so that a given substation is in operation only when a substantial load can be carried. The load factor and conversion efficiency are thus improved and the running-light losses, which amount to from 3 per cent to 7 per cent of the machine capacity, are eliminated.

Further, elimination of labor affects the design of substation buildings. Cheaper, and in some cases smaller, buildings can be provided. Windows can be practically done away with, space and conveniences for operators can be omitted and no provision need

be made for heating.

THE PROBLEM OF THE CITY SYSTEM

On city systems the problem frequently takes the form of a comparison of a few manual substations with many automatics. The city may be divided into load zones and the comparison simplified so that, in effect, one manual may be compared to three or four automatic substations.

The first basic assumption to be made is that the substation apparatus and direct-current distribution plant, per se, are equally reliable in operation, requiring no more reserve equipment for one scheme than the other. If one scheme offers certain advantages over the other during times of emergency, these must be capitalized according to the best judgment of the operating department.

Similarly the same average trolley voltage must be used throughout the comparison. The trolley voltage not only affects the speed of the cars, and with it the platform expense, but also the distribution losses and the total power output of the substations. Furthermore, the trolley voltage assumed affects the amount of feeder conductor required and therefore the capital expense. If it is impossible to assign the same trolley voltage to both schemes, then the differences resulting must be estimated and the equivalent capital expense debited to the proper scheme.

Another basic assumption is an equality in both schemes of track and negative return drop, and a final one is that the load on the system and the area covered by the same must be the same for both schemes.

The underlying principle in the application of a multiplicity of small substations is that, compared to a single large station, the amount of positive copper required is theoretically in an inverse ratio to the number of substations. The limit toward which this principle leads is that number of substations which permits the elimination of all feeder conductor, the entire load being carried by the trolley.

In the practical application of this principle it is impossible to realize the theoretical saving in positive conductor due to the many local conditions such as non-uniformity of load distribution, methods of sectionalizing the trolley, use of negative feeders to avoid unnecessary electrolysis hazards, proximity of other points of power supply, insur-

ance against interruption of service, local city ordinances, building restrictions, etc. It serves then primarily as a criterion by which to judge how well any proposed scheme has been laid out.

The next principle is that the number of substations in operation can be made proportional to the load, maintaining the conversion efficiency at a maximum.

The direct-current distribution efficiency remains the same regardless of the number of substations, if the same average trolley potential is maintained and the load is evenly distributed. Actually the distribution efficiency will be slightly higher since feeders will parallel the trolley wire even where calculation would indicate the average voltage would be maintained without supporting feeders.

The alternating-current distribution system, if laid out for uniform voltage drop, would have the same efficiency regardless of the number of substations. This cannot usually be accomplished and a slightly lower efficiency results in practice which offsets the gain in efficiency mentioned in the preceding paragraph.

The peak load on a city system does not appear simultaneously at all parts of the system but only at a few relatively widely separated localities. It then gradually shifts to other parts of the city. Hence the greater the number of sources of power the shorter the feeds to load peaks will be and con-

sequently the more efficient will be the entire system of direct-current distribution employed.

Another principle is that the number of substations selected and their locations must be such as to produce the most economical operating results. An aggregate of several small substations cost more than a single substation of the same total capacity. The difference, however, is offset by the smaller amount of positive and negative conductor required in the former scheme. By means of automatic control the small stations can be operated with a minimum of labor; they can also be operated with a minimum of light load losses.

A final principle concerns reserve capacity. In a single large manual substation at least one machine, equal in capacity to the largest, must be held in reserve. Thus there is always one idle unit upon which fixed charges must be carried. With a multiplicity of small substations, however, each acts as a reserve on all those surrounding it. The reserve is included in the normal capacity and is always an active reserve earning a return on the investment.

The comparison between manual and automatic control for metropolitan systems is necessarily close, the more so the denser the traffic. It is difficult to make specific statements which are of value in connection with city substations as a class.

Emergency Stops*

Some Practical Suggestions as to the Emergency Use of the Motors in Dynamic Braking, with Particular Reference to Interurban Operating Conditions

> By H. C. De Camp Assistant General Manager the City Railway, Dayton, Ohlo

THE best practice for making emergency stops to avoid accidents is a subject which has not received the attention it should, judging from the lack of information to be found in rule books and railway publications.

In the standard code of rules for city operation, Issued by the American Electric Railway Transportation & Traffic Association, Rule No. 260 states:

Motorman must not use the reverse to stop a ear except to avoid accident or when the brake rigging is disabled. Motorman must not reverse when the brake is set, but must release the brake and throw reverse simultaneously and when the reverse handle is thrown in position, apply current one point at a time, otherwise the fuse will melt, or breaker release. Sand should be used when making an emergency stop

Now, in interurban operation such a stop would not be fully effective, if the operator followed the rule literally. When emergency air is applied on a heavy interurban car it takes six or seven seconds after the brake handle is placed in release position for the brakes entirely to release. If the operator should reverse at the same

*Abstract of paper read at meeting of Engineering Council, Central Electric Rail, way Association, Louisville, Ky., Jan. 18 and 19, 1923

time, the wheels would lock and the car slide for a considerable distance,

Under the heading "runaway car" we find Rule No. 261 as follows:

While descending a grade, should it not be possible to stop a car equipped with two motors by means of the brake, or by reversing in the usual manner due to lack of current on ear), the motorman must, with his controller still reversed, advance cylinder to the last position. In the event of the car being equipped with four motors, the act of reversing will cause it to stop. Should a car equipped with two motors start to roll backward while ascending a grade, due to lack of current on the car and inability of the brakes to hold it, the controller cylinder must be advanced to the last position. Should the car be equipped with four motors, the reverse set in the forward position will stop the car.

If one were to interview operators of

If one were to interview operators of electric cars, he would find a wide range of opinion, notwithstanding the above rules, as to how emergency stops should be made. Some believe that emergency air and sand should be used, some would reverse and some would use both air and reverse. It might be well, therefore, for this association to take some action to determine the best method to be followed, under various conditions, both for interurban and city services.

In making an emergency stop, even under ideal conditions, it is not always possible to prevent an accident, but the desire is to bring the car to a stop in the shortest possible distance. For example, an interurban car weighing thirty-five or forty tons, running at a speed of 40 m.p.h. on a straight and level track, will travel approximately 420 ft. before it will be brought to a stop. Obviously, if an automobile or other obstruction appeared upon the track 200 ft. ahead of the car, an accident could not possibly be prevented.

Occasionally an accident occurs to a car on a steep grade, in connection with which it is stated that the operator lost control of the ear and it jumped the track at a curve or switch. resulting in serious injury or death to passengers. As there are four methods of stopping an electric car when it is equipped with air brakes and three when air is not used, it does not seem reasonable that such accidents should occur if proper instructions are given to operators. In order, from the standpoint of making a quick stop, the methods are: emergency air and sand, reversal of the motors, dynamic braking or "bucking" the motors, as described in Rule No. 261, and hand brakes. Unfortunately, on a large number of properties where air brakes are used exclusively, the hand brakes are not in as good an operating condition as they should be, owing to lack of use.

When an emergency stop is made with air and sand, the sand is applied regardless of the condition of the rail, in order to prevent skidding the wheels, when the speed of the car is materially reduced.

In reversing the motors, the number of points of power to be given should be determined by actual test of the various types of equipment on the property, in order that the breaker will not be released, as this would cause delay to reset it. Besides, even if the breaker did remain in, the draft of too much power might tend to lock the wheels, causing them to skid, with loss of effectiveness of the stop.

When dynamic braking is resorted to, after other means have failed, the following procedure might be followed rather than that covered in Rule No. 261:

On a four-motor equipment using K control, the reverse handle must always be in the opposite direction from that in which the car is moving. If the car is moving forward, the reverse handle would be pulled backward and the main controller handle left in the off position. In the same situation, with a twomotor equipment, after the reverse handle has been pulled backward, the main controller handle should be moved to the last point. Under these conditions, the car will be brought to a sudden stop and if going down a grade, will not stand still, but move at slow speed, not sufficient to cause much damage, but such as to permit the operator to block the wheels.

When the car is headed up grade, with the reverse handle in the forward position, and it tends to run backward, the reverse handle would not be touched, as it would be in the opposite direction from that in which the car is

moving. In a two-motor equipment, the reverse being left in the forward position, the main controller handle would be moved to the last point.

When dynamic braking is resorted to it is also best to instruct the motorman to throw out the breaker. The trolley may be off the wire, and, in the case of a two-man car, while the motorman is trying this method, the conductor might be trying to put it on. The sudden restoration of the line current, while the motors are generating, might damage the equipment to such an extent that the stop could not be made.

Where cars are equipped with pneumatic or electric remote control, using trolley current for operating the switches or contactors and thus requiring that the main controller handle be placed on the first point before the reverser will be thrown, some mechanical means should be provided to throw the reverser by hand, as both the air

and current may be off at the same time. Otherwise this method of emergency stopping could not be used.

In both interurban and city service, where air brakes are used exclusively, it is good practice to make one or two safety stops with the hand brakes, in a round trip, to assure the operator they are in good condition.

In view of what has been said, it might be well to appoint a committee to make exhaustive tests, under all conditions and with all kinds of equipment, so that specific rules could be promulgated for the proper instruction of operators of electric cars, so that when emergency stops are properly made, accidents can be minimized if they cannot be prevented. Then it would be well for operating officials to demonstrate to their men the methods recommended, as this would be more effective in practice than oral or printed instructions.

Automatic and Semi-Automatic Substations for Electric Railways*

A General Review of the Subject with Illustrations to Show the Sources of Savings Which Result from Non-Manual Switching—Full Automatic Control in General Appears Preferable

BY C. A. BUTCHER

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THE function of a railway substation is to apply a reliable source of power to a certain portion of the system. The traffic department considers the power supply reliable if it enables it to maintain satisfactory schedules. The engineer's problem is to insure such reliability by the most efficient means.

Is automatic operation more or less reliable than manual operation? There will be two answers to this question—yes and no; but the affirmative answer will, without a doubt, be by far the more general.

Measured by past standards, most manually operated substations are considered reliable, therefore the expenditure for equipment to convert them for automatic operation must be justified by economy. The major saving is, of course, that due to the elimination of operators. Comparing this saving with fixed charges on the capital investment required for the automatic features will, everything else being equal, determine whether or not the change should be made.

A study was recently made to determine whether it would be economical to equip the substations on a certain system with automatic switching. Each station is equipped with two 300-kw. units, and the first thought was that the fixed charges on such equipment would probably offset the gain to be realized by the saving of operators'

•Abstract of paper presented at annual meeting of Central Electric Railway Assoclation, Louisville, Ky., Jan. 18 and 19, 1923. wages. The hourly wage rate for operators averages 51 cents, and in some cases the hours of duty overlap. In several stations, as high as thirty manhours per day are required.

The analysis, covering a group of five stations, shows that the total cost of automatic equipment installed is \$80,000 and the net saving in labor, after allowing for periodic inspection of automatic stations, totals \$20,050. Allowing 15 per cent per annum to cover maintenance, insurance, interest, depreciation and taxes, there remains a net yearly saving of \$8,050.

REDUCING POWER LOSSES

In another station, not included in the group of five, two old low-speed, engine-type, double-current generators are operated as synchronous converters. As such, they do not compare favorably in efficiency with converters of modern design. With an average load of 40 per cent the efficiency of the old machines, based on original conditions, is approximately 83.5 per cent. On the basis of twenty-eight machine-hours per day total for the two units, the annual conversion loss at 1.5 cents per kilowatt-hour is \$4,047.

A single 500-kw. modern synchronous converter is adequate for the service at this station. On a comparable basis it will operate for twenty hours per day at an average load of 45 per cent. At this load, the efficiency is 94 per cent. The annual conversion loss would be \$1,471.

The cost of automatic switching and a new converter operated from the

present transformers, all installed, will be approximately \$15,000. Allowing 15 per cent for annual charges and \$300 per year for periodic inspection, the annual charges total \$2,550. Added to the power saving of \$2,576 there will be a labor saving of \$4,500 per year, or a total of \$7,076. The net annual saving of \$4,526 will pay a return of 30 per cent on the investment.

WHEN IS SEMI-AUTOMATIC SWITCHING JUSTIFIED?

Started manually, a semi-automatic substation runs until shut down according to some schedule by one of a number of different methods, such as by a time switch, by momentary interruption of the alternating-current supply. or by an attendant who enters the station for that purpose. Such operation requires that the equipment include all of the protective devices essential to a full automatic equipment, such as those which operate to prevent open-phase running, excess temperature of machine or transformer windings, overheated bearings, operation with open shunt field winding, etc. Complete automatic operation of the direct-current equipment is, of course, essential.

Since the station runs continuously during its scheduled period of operation, there will not be the saving in light-load losses such as would be effected by a full automatic equipment; however, load requirements may be such as to make this item negligible. The item of attendance is not entirely eliminated, and, as the following comparison will show, the cost of the additional equipment required for full automatic control is such that the attendance item is quite apt to exceed the fixed charges on the additional investment.

The following is a comparison of the investments in the three classes of switching equipment for a 300-kw., 60-cycle converter substation operated from a three-phase, 22,000-volt supply circuit. The investment in each case includes a high-tension oil circuit breaker.

Fixed

	Invest-	harges 15 r Cent	Opera-	Annual Charges
Manual Semi-automatic. Automatic	\$2,385 3,460 5,950	\$358 519 893	\$3,600 900 300	\$3,958 1,419 1,193
		Sen Auton		utomatie
Investment in ex- ual switching Additional fixed el Operating saving I Net saving Return on investn	harges per year	\$1,0 2,7 2,5	075 161 700 539 236	\$3,565 535 3,300 2,765 80

The cost of full automatic switching in excess of semi-automatic switching is \$2,490. However, the full automatic station shows an additional yearly saving of \$226, which represents a return of 9 per cent on the additional investment.

While the returns from full automatic switching do not appear so attractive as for semi-automatic, and the investment required is greater, the actual difference in capital required is

quite small compared with the advantages obtained from full automatic equipment.

In case of an interruption of the alternating-current power supply, all semi-automatic stations on the lines involved will shut down and it becomes necessary for an attendant to restart each one.

As the capacity of the stations under consideration increases, the advantage in first cost favoring semi-automatic switching becomes materially less, because the cost of additional full automatic control features remains practically constant except for the cost of the electrically-operated starting and running switches. The advantage is of consequence only for the control of units of 500 kw. capacity or less. Since units of this rating are used mostly in interurban service, it is evident that only in such service will the unattended, semi-automatic station have a probable application. In this field, it will be limited to those stations from which a temporary interruption of service is not of service consequence.

AUTOMATIC FEATURES IN ATTENDED STATIONS

The features of semi-automatic stations may be applied to large manually operated stations to great advantage. For example, automatic control of the direct-current switching equipment and especially of the feeders insures a minimum of interruption to service from faults which occur in the direct-current distribution system. General application of protective devices provides adequate protection to the station equipment and eliminates much of the hazard of the human element.

Since substations of 1,000 kw. capacity or higher are general only on the larger railway systems in which an interruption of service is of serious consequence, there will be few who will advocate unattended semi-automatic operation of such equipment. A proposal covering semi-automatic switching consisting of full automatic control of the direct-current equipment and all of the various protective features for a number of large stations supplying suburban service was recently made.

By means of a rather complete signaling system, also proposed, a single operator, regardless of the station of the group in which he might be, would receive a warning signal of any change which might occur in any of the main and feeder circuits at any station. By the manipulation of a selective system similar to that of the ordinary machine telephone switching, he would be able to determine from which station and by what device the alarm was set into operation.

An automobile and good connecting roads provide for covering the distance between any two stations of the group in a few minutes.

If the operator should determine that a direct-current feeder circuit breaker has opened, he would know that when the fault in the load circuit has been cleared this circuit would be automat-

ically reclosed. However, if the reclosing should not take place in reasonable time, he would notify the line department of the circuit involved. Since the feeder equipment proposed is of a type which only opens on short circuit, and not on overload, the operator would feel sure that an outage of any duration is being caused by a grounded trolley or feeder.

Should he determine that a machine has shut down, he would go to the station to restore service by restarting the machine if his investigation showed that the conditions causing the shut down were transient.

It is proposed that each station shall be supplied from separate alternatingcurrent circuits so that only due to a general disturbance would all stations be shut down simultaneously. Following such general disturbance, it would. of course, take considerable time to restore all of the stations to service. The study made indicates that the investment in the necessary equipment should be a profitable one.

SWITCHING EQUIPMENT FOR NEW STATIONS

In cases where it has become necessary to abandon obsolete direct-current generating stations, the purchase of power from large modern central stations and the installation of converter equipment located at the most economical points of distribution are productive of a saving in power. This is due to the reduction of losses in generation and distribution. The obvious location for a single substation replacing a generating station would be at the load center or as close to it as possible. Where the capacity involved is not such as to require more than two units, automatic operation of such a station effects additional saving by eliminating the necessity for operators. Where the eapacities involve more than two units, economy is effected by the installation of a number of smaller automatically controlled stations at such locations as will permit of the maximum reduction of investment and power losses in the power system as a whole consistent with good operation.

SUPERVISORY CONTROL IS A RECENT DEVELOPMENT

Supervisory control systems, using the principles and the highly developed devices of machine telephone switching, provide simple and efficient means for placing the supervision and control of any number of stations in the hands of a single dispatcher. By the combination of automatic switching and supervisory control, even the most complex switching arrangements may be successfully controlled without a station attendant.

There are no general solutions to the many problems involved and in no two cases are the conditions encountered the same. Therefore, each proposition must be considered separately. The correct choice of switching will be that which best meets financial, economical and operating conditions.

New York Association Holds Midwinter Meeting

THE regular midwinter meeting of the New York Electric Railway Association was held at the Hotel Commodore, New York City, on Jan. 25. There were morning and afternoon sessions, with a banquet in the evening. Owing to the crowded condition of the columns of this paper this week, due to the report of the Louisville meeting of the Central Electric Railway Associaion, it is possible to print in this issue only two of the papers presented at the New York meeting. One of these was on "Selling Principle of the Weekly Pass," by Walter Jackson of Mount Vernon. This paper was discussed in person by W. H. Boyce, New Brighton, Pa., and E. M. Walker, Terre Haute, Ind. S. W. Greenland, Fort Wayne, Ind., sent a written communi-cation. In addition the following papers were presented: "Lubrication of Railway Motors," by L. M. Clark, New York; "Fundamental Principles of State Motor Vehicle Common Carrier Regulation," by D. C. Fenner, New York;
"Insulation of Catenary and Other
Power and Railway Systems," by Arthur O. Austin, Barberton, Ohie.

Mr. Clark's paper appears in another column of this issue. The papers by Messrs. Fenner and Austin with the discussion on them and an extended report of the other features of the meeting will be published in the issue of

next week.

Earlier in the day there was a special meeting of the auditors and claim agents of a number of the New York State companies for the purpose of perfecting an organization whereby they might meet frequently and discuss problenis with which they might be confronted. A chairman was elected and two meetings a year will be held.

THE BANQUET

The principal speaker at the banquet of the evening was Hon. Carl D. Jackson, former public utility commissioner of Wisconsin and at one time president of the Association of Public Utility Commissions, who condemned the plan of returning to local regulation in New York State. He said that fortytwo states in this country now have state utility commissions and that their utility laws are based largely on the laws of New York State and Wisconsin which were pioneers in this legislation. He said there are four principles which should be followed in the relation of the utility to the public. The first of these is that service is the principal thing which the public desires. The second is that service should be rendered at as reasonable a rate as possible with justice to the public and utility. The third is that competition as a regulator is wrong and wasteful, and the fourth, that efficient regulation demands a supervision of security issues of utilities. All regulation embodies these principles.

Finally, these principles should be enforced by an impartial body. The city could not do this because it is an interested party to the question of rates. Jurisdiction must be by the state. Mr. Jackson then gave examples from Wisconsin, showing objections of city regulation. At the present time, in any state, such a step would be backward and against public interest. Mr. Jackson also said that it would be most reactionary and disastrous to return to local control of utilities.

American Engineering Council

THE annual meeting of the American Engineering Council, the operating body of the Federated American Engineering Societies, was held in Washington Jan. 11 and 12. Mortimer E. Cooley was re-elected president of the federation and J. Parke Channing, Calvert Townley, Philip M. Moore and Gardner Williams were elected vicepresidents. Among the topics considered on which resolutions were adopted were improvements in the Patent Office. better conditions for the development of water powers and engineering education

The principal addresses at the banquet on Jan. 11 were by Ambassador Caetani of Italy, Calvin W. Rice and Elmer A. Sperry. Mr. Rice reported on his South American trip and urged an interchange of engineering education between the United States and the countries of South America. declared that Verne L. Havens had performed an invaluable service in bringing the engineers of Latin America and those of the United States closer together. Mr. Sperry told of progress made by the engineering professions of Japan and pointed out that there is much that American engineers can learn from members of their profession in the island empire.

Prince Caetani, who is an engineer, spoke about the work which Italian labor had done and could do in developing the engineering, industrial and agricultural enterprises in this country. He also gave statistics of electrical enterprises in Italy and said that by electric transmission systems the water power in the Alps, where the water is plentiful in summer, is being used to supplement that in the Apennines, where water is plentiful in winter and rather scarce in summer.

American Gear Manufacturers' Association

HE seventh annual meeting of the American Gear Manufacturers' Association will be held at the Hotel Cleveland, Cleveland, Ohio, on April 19, 20 and 21.

At a recent meeting of the executive committee of this association, A. W. Copeland, president of the Detroit Gear & Machine Company, was elected to fill the vacancy on the committee caused by the death of John B. Foote, president Foote Brothers Gear & Machine Company, Chicago. Mr. Copeland's membership on the committee will continue until the annual meeting of the association in April, when this position will be filled by election.

Lubricating Railway Motors*

Cleanliness Is Quite as Essential as the Use of a High Grade Lubricant -Water and Dirt Must Be Kept Out of Bearings to Obtain Efficient Service

By L. M. CLARK

Vice-President Railway Improvement Company, New York, N. Y.

HERE is probably no piece of it out. When water gets into a motor I machinery that is subjected to more severe service and more abuse and given relatively less care than a railway motor. The earlier types were designed to be lubricated by grease. Later on, motors were brought out adapted for oil lubrication, and in a more or less makeshift manner the older motors were converted over. Generally speaking, the new design was a compromise between the top-feed principle of the earlier motors and the bottom-feed extensively used for truck journals. Large openings were located in the sides of bearings and housings provided with cavities extending some distance below these openings. The housings were filled with saturated waste, intended to be in contact both with the shaft or axle, through the bearing openings, and a supply of oil contained in the bottom of housings. Partitions in the housings afforded a means of measuring the depth of the oil. Spring-actuated, felt-lined, flanged covers closed the tops of the housings. This general arrangement has remained practically unchanged for over twenty vears.

We are told that lubrication consists of the separation of adjacent bearing surfaces by a film of oil. Logically, there should be nothing in the oil that would cause bearings to wear excessively. Let us assume the operators of such motors use good oil and plenty of it, and yet the bearings wear out. Why? Not because they are deficient in material or workmanship; not because they are improperly lubricated in so far as the quality and quantity of oil is concerned, but because dirt, grit, wheelwash and other foreign substances enter the bearings.

How do all these foreign substances get into the bearings? Mostly, by reason of loose-fitting covers, weak springs, defective gaskets and, not infrequently, lost covers. Furthermore, every time a cover is opened for inspection or oiling more dirt gets in, and a whole lot of it too. When the interiors of housings are being inspected, it is not an uncommon occurrence to observe the packing waste reposing on the top of a dirty motor frame, and this same waste is put back into the housing, with perhaps a dash of oil to assist in washing the dirt down into the bearing.

Wheel-wash is a disastrous element, and most difficult to contend with, particularly with side-feed motors. During rainy weather, and especially when operating over tracks submerged in water, it is almost impossible to keep

*Abstract of paper presented at mid-winter meeting of the New York Electric Railway Association, New York, N. Y., Jan. 25, 1923.

housing, the capillary function of the packing waste immediately ceases, it quickly becomes glazed, and there is no further lubrication until these conditions are corrected.

One of the bugbears of railway motor lubrication is the glazing of packing waste, which intercepts the flow of oil to the bearing. Glazing is caused by dirt clogging the capillary paths, by contact with water or by insufficient saturation. This trouble is so prevalent that many companies feel justified in using the lower grades of packing waste, which is false economy. Packing waste will never become glazed so long as a clean film of oil is maintained on the shaft or axle. By eliminating dirt and water, and keeping it properly saturated, a good grade of wool waste will require no attention for many vears.

Wool, in its ordinary twisted yarn form, has a capillary lift of approximately three inches with the average oil used for motor lubrication. Cotton ranges from 5 to 6 in., dependent upon the degree of twist. This difference is due to the relative size of the capillary paths in the two materials. Some companies use mixtures of wool and cotton. based upon the theory that cotton adds to the saturating capacity, and makes for better results. It is not the greater saturating capacity, but the increased average capillary lift that overcomes certain difficulties. Some motor housings are constructed where the distance from the bottoms to the bearing openings is as much as 5 in. With wool waste having an approximate lifting capacity of but 3 in. it is obvious what happens when less than two inches is contained in such housings.

The rate of oil feed through wool or cotton varies radically according to the height of capillary lift. For example, the housing of a side-feed motor is filled with 3 in. of oil. The first quarter inch will feed out within twenty-four hours. the second may last four days, the third two weeks. This clearly brings out a condition of too much oil at the start and not enough later on. Bearing temperatures have much to do with the rate of feed. As the temperature increases, the viscosity of the oil becomes less and the rate of flow through the capillary paths of the packing waste correspondingly greater.

The function of lubrication is to prevent abrasion of the bearing surfaces and to assist in conducting the heat generated. Fundamentally, oils for motor lubrication should possess a high coefficient of adhesion, so that the film will not slip away from the bearing surfaces, and inversely a low coefficient of cohesion-frequently referred to as

internal friction so that the constituents of the oil may be readily moved among themselves, as it were. High cohesion is detrimental to good lubrication because more power is required to turn the moving parts. The range of viscosity should not be too great, and the viscosity at the normal maximum running temperatures of bearings should be as low as is consistent with insuring a continuous film between the bearing surfaces. This at once brings out the desirability of using a lighter grade of oil in cold weather. Heavy oils possess a high coefficient of cohesion, and they increase bearing temperatures materially. Heat indicates a translation of energy, and in these days of power economy more attention should be given to the question of lubricating oils.

Many electric railway operators seem to think they are securing satisfactory lubrication so long as hot bearings are not prevalent. Hot bearings are a disease, and in most cases are directly due to mechanical defects. Obviously, inadequate lubrication will aggravate such troubles, whereas good lubrication will tend to lessen them. By the use of mild abrasives mixed with suitable oils, a mechanically perfect bearing can be worn entirely out in a few hours without causing it to run hot. The elimination of hot bearings does not by any means spell perfect lubrication.

With regard to bearings, we all appreciate the desirability of good materials, accurate workmanship, smooth finishes, correct clearances, alignment and similar details. There are, however, two points that are frequently overlooked. First, chamfering the inside edges of waste openings is absolutely essential to insure the flow of oil around the shaft or axle. The chamfering should be liberal, not a mere breaking of the edges but a thirty-degree cut-back of at least threesixteenths inch. Second, the provision of one or two grooveways between the waste openings through to the flange ends of bearings to assist in conducting oil to the faces of flanges, which are the most difficult parts of bearings to lubricate.

Where means are provided for keeping the packing waste continuously saturated to the proper degree, the top-feed principle of lubrication gives the best results. There is no tendency for the packing waste to settle away from the shaft or axle, and smaller quantities are required. By utilizing the combined factors of capillarity and gravity, the waste openings in bearings can be made much smaller. This is very desirable, both in point of increased bearing surface and in maintaining rotundity of solid bearings that are pressed into the housings.

Split bearings are a necessary evil, the chief difficulty being that of keeping them tight in the housings or frames. Dowel pins and keys serve to hold bearings in position for a time, but eventually they become loose and troubles result. Means should be devlsed for locking axle bearings securely in place, with a sufficient range of take-up to compensate for irregularities in the bores of housing or frames. The welding up and reboring of motor frames is an expensive job, but much of this is avoided where bearings are efficiently lubricated.

In the past, too little attention has been given to the grade of labor employed to oil motors. The job is a dirty one; it is frequently done at night and under conditions that are anything but agreeable. From the standpoint of

relative importance, an oiler should be one of the best paid employees. Better than this, however, is a system of lubrication where the human element becomes a negligible quantity; a system that will eliminate all dirt, wheel-wash and other destructive agents, and automatically supply clean lubricating oil in quantities commensurate with the work which bearings are called upon to perform.

The Selling Principle of the Weekly Pass*

Particulars Are Given of Various Installations Beginning with Racine in 1919-The Pass Has Developed Off-Peak Riding and Won Many Automobile Owners to the Cars

> By Walter Jackson Fare and Bus Consultant, Mount Vernon, N. Y.

THE adjective "selling" has been A chosen purposely to stress from the start that the unlimited ride, transferable weekly pass stands for something much more than a new rate. It is a change from the non-salable flat fare to the salable differential fare. The very points in which the weekly pass differs from the blanket transportation used abroad emphasize this selling principle. The foreign season ticket is seldom available for a shorter neriod than one month, so that it cannot be used to make a wide appeal. It is restricted (theoretically) to use by the original purchaser, and it is so unscientifically priced as a rule that it is looked upon as an evil rather than as a sales leader in the merchandising sense. Contrast this with the American weekly pass. It can be bought for the shortest calendar period-one week -so that any consistent rider of the smallest means can enjoy its advantages. The purchaser does not have to sign his name to formidable documents, but can buy the pass on the car as easily as a single ride. It is not only transferable, but transferability is one of its big selling points. Finally, the company reminds the purchaser of the value of unlimited riding in every way, instead of regretting that he is on the cars four times a day.

If the differences between the foreign and American season tickets have been correctly set forth, then the latter embodies a new selling principle. This is borne out by experience. In two generations the foreign season ticket has failed to achieve one-half, even onethird, the popularity in riding and revenue ratio attained by the American weekly pass in two to three years. There are installations, like Youngstown and Tacoma, where practically half of all the rides and more than one-third of the revenue comes from pass riders.

THE ORIGIN OF THE WEEKLY PASS

The weekly pass first saw the light at Racine, Wis., a city of some 60,000 population, in August, 1919. There were two reasons that led the writer to

*Abstract of paper presented at midyear meeting of New York Electric Railway Association, New York Jan 25, 1923.

suggest such an innovation: The first was that it would benefit safety car operation immensely through cutting down the transactions with odd fares, tickets and transfers; the second was that it would tend to equalize inequalities between long and short-haul riders in a city with distances too short and headways too long to make use of a zone-fare system.

The idea behind the second point was that if we sold a person unlimited transportation the one living close in would take more rides (as in going home for lunch), while the person living further out would be too far away from home to go to lunch, even when luncheon riding cost him nothing. Of course, the passenger thinks in terms of trips and not of miles, so that in actual practice the short-haul man is satisfied that as he is taking more rides than the long-haul man he is getting a square deal whether he gets more miles or not.

This brings up an objection to the pass that used to be considered a crusher, namely, that a person on a pass would ride so much as to put the railway into bankruptcy. These objectors must have been thinking of the year 1900 or so, when people rode on the trolley cars for the novelty and pleasure of the thing. What really happens is this: The pass buyer learns to use the street railway in exactly the same way as he uses the elevators in a building, namely, as a service. He no longer has to figure whether it will be worth while to pay fare for this or that short ride. He does ride oftener, therefore, to serve his convenience and to save his time; but he certainly does not ride for fun or to spite the railway,

The transferable feature of the pass has not justified the fears of the ohjectors, either. When a pass-holder goes off to work in the morning, the pass will probably stay in his pocket until he comes back. The only exception is that of the business man who may turn it over to his errand boy. Even this is unimportant, for the errand boy is not traveling in the rush hours and it is a safe bet that most of the money he used to get for car fare never got as far as the car-let alone the company's treasury.

In every community there are a number of artisans, workmen, agents, solicitors and others whose work takes them to different parts of the city, but they make up but a small percentage of the total riding. Beside, in these days almost all such persons have been doing their business in cheap automobiles. If, as has actually happened, we induce an insurance agent to give up his auto for a car-pass, we are getting back business that would otherwise be lost. Let the agent ride fifty times a day if he wants to. He does all his business riding in the off-peak hours, so he costs us no more than if he rode only twice a day.

THE ECONOMIC BASIS OF THE PASS

Now as to the pricing of the pass: If we were in the good old days, when the public had either to take a car or walk, we could not think of going below the price of three ticket fares a day or say twenty a week. By ticket fares is meant, of course, whatever rate the fairly frequent rider is enjoying. Naturally, the pass riders are drawn from the ticket class and not from those who ride so seldom that they find it better to pay the maximum or cash fare. But as we are not living in monopoly days, we must consider quite a variety of factors that should influence the price we set for the pass.

In the most favorable instance, as in Terre Haute, the price of the pass equals twenty fares. We did not have to make any great bargain to draw traffic. The 5-cent fare and a 60 per cent increase in service through safety cars had continued to increase the trolley car habit despite an increase in private automobiles. In Terre Haute so many people already had the habit of using the trolleys four times a day that there would have been risk of loss if less than twenty fares had been charged for the privilege of unlimited riding. Belief in the twenty-time rate has been justified by the facts. Revenue is running 6 per cent ahead of the more prosperous period of 1921 and early 1922, and there are 1,600 pass buyers in a town of 75,000.

The next highest pass rate is that of Racine, the pioneer installation. At first it cost practically eighteen times the ticket rate of 5.5 cents and then slightly more than seventeen times the 5.83 cents ticket rate. Two and one-half years' experience make this installation of exceptional interest. The pass was installed when business was good, and the writer figured that once Racine sold more than 1,000 passes it was on the right side. This figure was attained within a month and from 2,200 to 2,300 are now sold. The pass brings 20 per cent of the revenue and about 35 per cent of the riding.

The course of the weekly pass in Racine is pretty good proof that it is not a short-lived novelty. In fact, the depression following the boom proved that the pass rider is the most persistent. When cash and ticket revenues fell off 30 to 35 per cent, pass revenue dropped only 10 per cent. This is because pass riders are naturally provi-

dential and also because they include the clerical and professional classes which do not lose their employment as suddenly as a factory workman. The pass also attracts the very people who would be most likely to use an automobile, if the car ride had not been made so cheap and pleasant for them.

In Fort Wayne the pass was installed at a price equivalent to sixteen times the ticket fare. Recent months show as high as sixteen per cent revenue over the same period of 1921, though, of course, not all of this increase should be credited to the pass.

A number of installations charge prices equivalent to fifteen or fourteen times the ticket rate. This is a satisfactory multiplier in communities where there is a lot of private automobiling with a consequently large number of pick-ups, or in places where there is some jitney competition.

The lowest price charged for a pass is that of Tacoma, which is equal to 12½ ticket fares of 8 cents. This low price was fixed because traffic had failed to increase over pre-war figures despite a liberal increase in service. The attempt of the administration to flood the town with 5-cent jitneys in its desperate effort to force the railway to go from 10 cents cash and 8 cents ticket to 5 cents flat was another factor. At any rate the people of Tacoma consider the pass such a wonderful bargain that more than 12,000 a week are sold-which means that more than 12 per cent of the total population are passholders. More than 50 per cent of the riding is done on a pass. In the rush hours practically three persons out of every four have no occasion to stop at the farebox-a wonderful condition for safety car operation.

THE PASS INCREASES THE CAR-RIDING HABIT AS EXPECTED

The sales thought back of the pass was that if we gave a wholesale rate for wholesale use and also relieved the patron of all figuring per trip and farehandling operations we would get him to use the cars with the same fine sense of abandon about cost that he was displaying in running an automobile. The writer's idea of a wholesale rate is one that compels the spending of a fixed. sum in a fixed period. When we sell cut-rate tickets without a time limit and without confining their use to one person at one time, we are not sure the ticket buyer is a truly wholesale customer. The weekly pass settles that question so clearly that wherever installed it quells the demand for a lower fare-if it does nothing else whatever. The steady rider is entitled to enjoy a 5, 4, 3, 2 or even a 1-cent fare if he gives us \$1 or more a week and does not take more than two rush-hour rides a day. By the same token, the nonsteady rider should pay 10 cents if necessary, while the semi-occasional rider is entitled to some ticket rate in between.

Almost everywhere the pass rider tends to take four gross rides a day. After allowance is made for the transfer trips in these rides, we find that the net rides range from twenty to twentyfive a week. So the pass rider has gotten to a 5-cent fare or less and enjoys a frictionless ride at the same time.

The pass does more than to increase the riding of the passholder. Since a person can take but two rush-hour rides, the rest of his rides are off-peak. Most of the off-peak rides are on account of entertainment. People do not usually go to entertainments alone. If the passholder goes out oftener, so does his sweetheart, or wife, or children, or chums-and for most of these there is paid a fare that would not have come otherwise. Also, if a passholder wants to ride four or five blocks, the nonpassholder has to trail along via car and thus another fare is created. Every passholder is a business solicitor who brings anywhere from three to five or more companion fares per week. This is why it is safe to figure on an even break as regards the passholders themselves.

PASS VERSUS JITNEY AND AUTOMOBILE

Although the Racine pass had no occasion to kill jitneys it proved capable of preventing them when the hard times came; and at Kenosha, the second · installation, it helped to root them out. Observation of this led the Youngstown Municipal Railway to try the weekly pass as a last hope against the 250 jitneys then rife in Youngstown. In a few months, more than half the jitneys were wiped out, the company's revenue advancing more than 30 per cent, while its usefulness to the public — as measured by customers - advanced more than 50 per cent.

The reason why a pass can kill the jitney is that it offers something that cannot be duplicated by the individually owned automobile-it grants blanket transportation. Only a corporation having vehicles throughout the community can offer a ride in any direction for any distance any time. The person who has signed up to buy unlimited electric railway service lets the jitney go by; the person who buys one ride at a time under the old system took whichever vehicle offered itself first. This reduces the jitney operator's revenue below the point of subsistence in spite of freedom from operating responsibility. This is so simple that it sounds too good to be true to some who still prefer to pin their faith on ordinances that turn out the jitney one year and bring it back the next.

The most unusual fight between car pass and jitney bus is offered by Tacoma. In that city the Mayor demanded a cut to 5 cents from the prevailing average fare of 9 cents, namely, from 10 cents cash and 8 cents ticket. To enforce his threat he imported twenty-eight buses that had found the going too hard after the railway consolidation and fare reduction at Spokane. These buses began business on a large scale in the very same week that the \$1 pass was introduced. Then the war began.

At first the 5-cent buses carried 9,000 to 10,000 people a day. These

were largely casuals who would have paid a 10-cent fare on the cars. On the other hand, the \$1 pass rate appealed to the industrial rider. In the first week, July 24-30, the railway sold 7,094 passes; in the eighteenth week, Nov. 20-26, 11,274. As the list of pass riders lengthened, the jitneys picked up less and less traffic during the rush hours and at night, when passholders are out with companions, in spite of the fact that they were charging only onehalf the railway cash fare formerly paid by 45 per cent of all riders. By the end of October, the buses were cut down to sixteen in number and were reported by local newspapers as giving most unreliable service. By that time, also, their business had been cut to less than 4,000 riders a day. In December but twelve jitneys were left.

THE PASS AND THE PRIVATE AUTOMOBILE

And now we come to the real ghost in the closet—the private automobile. What can the pass do about that?

The pass can and has done something to minimize the losses due to the private automobile and its carriage of others beside the man who drives to his office.

The first thing we ought to consider is that a man drives his own car because he thinks it is pleasant to move fast and to have control of the means of locomotion. He may be wrong about the greater speed after making allowance for opening the garage and for parking, but he certainly is right as to the pleasure one feels in controlling instead of being controlled. That seems worth the difference in the cost of car and auto riding.

The weekly pass has been found to appeal to the autoist for like reasons. He does not have to think of the cost of each ride; it is prepaid. He can board the cars as often as he pleases without fussing for change, tokens, transfers, etc. He acquires the feeling that he really controls the cars, for they stop at his beck, and all he has to do is to display his sign of ownershipthe pass. Then, too, the pass so vividly contrasts the cost of unlimited car riding against unlimited auto riding that he is made "furiously to think" about his extravagance. That is why Youngstown, Fort Wayne, Tacoma and other pass operators are sure that some brands have been snatched from the hurning.

The pass also recovers many pickup riders. The misplaced good-nature of auto owners is a mighty serious thing in the small and medium-sized town. If we can get hold of the man who is picked up say every third or fourth trip, we are getting someone who will yield the same weekly revenue whether he rides or not. There is such an independent streak in most of us that once a pick-up rider has a pass he does not linger along the curb waiting for a gasoline Samaritan.

In short, if the pass succeeds in getting back automobile users, it is because it places such strong reliance

upon the selling principle of making it as easy, instead of as hard, as possible for the customer to do business with us. If the railway manager himself had to pay 7, 8, 9-cent and similar ungodly fares day after day, there would be greater willingness to move toward their practical abolition.

THE PASS ON ZONE-FARE SYSTEMS

The writer believes just as firmly in differential fares based on distance as he does in differential fares based upon revenue guaranteed for a fixed period. In our smaller cities, the distances are too short and the headways too long to make a zone fare practicable as a revenue getter. The person waiting for a car would, too often, be able to walk far enough to get the basic rate. In our larger cities, however, we should have a short-haul fare for the many pick-up rides that are possible in a city having a business-amusement district a mile or more in length as well as a number of self-contained neighborhood centers.

The San Diego Electric Railway is a splendid example of a zone fare developed along right lines. Since Jan. 1, 1921, this company has had a basic or one-zone fare of 5 cents, and a twozone fare of 6% cents monthly commutation, 71 cents on a four-tickets-for 30-cent basis and 10 cents on straight cash. The revenue increases were far greater than similar companies could show for flat-fare increases which drove away the short-haul rider, and the company actually gained riders without the stimulus of war or postwar activities. The San Diego plan was worked out by E. J. Burns, now assistant general manager of the company, and its success was due not only to knowledge of correct principles in zoning but to a well-conceived system of informing the public in advance.

In the desire to make its service still more popular and easier to buy, the company commissioned the writer to see whether the weekly pass could be used to supplement the zone-fare system to advantage. As of Jan. 1, 1923, the company installed a \$1 pass good in both the inner and outer zones of San Diego, a \$1.25 pass for three suburban routes and a \$2 pass for a fourth suburban route. The thought in closing up the two city zones was that there would be a tendency for the average number of miles ridden per pass to approach the same figure whether the rider was a one-zoner or two-zoner. To illustrate: Both classes are at liberty to ride home to lunch without paying fare, but only the person who is ten to fifteen minutes from his home can undertake to do so. It ls quite possible for three trips a day by a two-zoner to equal five trips a day by a one-zoner. Of course, there is a limit to this equalization, and that is why we added the \$1.25 nnd \$2

It is worth mentioning that in adopting the passes, the San Diego Electric Railway has retained all existing cash, ticket, round-trip and monthly commu-

tation fares. It takes the selling attitude that the customer is entitled to pick the class of riding goods he wants, even if it does make a little more work in the accounting department. An electric railway, it believes, exists to sell rides as the customer wants 'em—not to oblige the worthy auditor.

Of course, the first application of the zone pass was on the Beaver Valley Traction Company in February, 1921. On this property, which is divided into 5-cent zones running across country and through towns with a maximum of 13,000 population, the pass has proved wonderfully popular at the rates of 85 cents for one zone, \$1.60 for two zones and \$2 for any number of zones. From a sale of 446 passes equivalent to \$515, it has gone to 1,215 passes (week Dec. 4-10) equivalent to \$1,532. The management has figured that about three-fourths of the pass sales are extra revenue due chiefly to the companion fares of the pass riders.

In both the Beaver Valley and San Diego installations the first idea was to make it easier for the passenger to patronize the company, particularly on one-man cars. The simplification of the fare transaction has been accompanied by a gain in revenue on the Beaver Valley and we hope that like benefits will come to San Diego.

Another zone-pass installation is that of the Houghton County Traction Company. This railway could hardly expect increased revenue in a period of poor copper business and decreasing population. It has at least achieved this result: The fare per trip has been cut almost in two for its most faithful patrons without a sacrifice in revenue. This, as the French say, is at least a success of esteem.

THE PASS IS NOT A CURE-ALL

It has already been intimated that there are other worth-while fare plans besides the weekly pass in its various forms of a twenty-four hour pass, school pass and off-peak pass. There is the zone fare; the off-peak hour ticket rate; the monthly service charge plan of Mr. Schaddelee; the many combinations possible with merchants and amusement interests, etc. The only plan that has no merit in the writer's eyes is the one that used to be the standard of America—the flat fare charging the same rate for any distance, for any degree of patronage and for any time of day. If the weekly plan promises to make great headway, it is because of its simplicity and selling lure. It can help the sick to get well but it cannot raise the dead.

CONTINUOUS PUBLICITY IS ABSOLUTELY NECESSARY

As said at the opening of this paper, the weekly pass is not a mere change in rate. Its possibilities cannot be properly exploited unless it is tied in with every ride-making possibility in the community. Let this exhibit of placards and posters speak for itself in proving that the ride can be sold and that this is the way to sell it.

American Association News

Executive Committee

THE executive committee of the THE executive committee

American Electric Railway Association met at Louisville Friday, Jan. 19. at the time of the annual convention of the Central Electric Railway Association. Numerous routine matters were acted upon and several important steps looking toward greater activity of the association work were approved. On recommendation of the finance committee, the executive committee approved a plan to rent more office space to provide for the work of the Committee of One Hundred, additional space for Aera, and to provide storage space, the association being now deprived of storage space in the basement which had been placed at its disposal heretofore. The net increase in expense to the association will be \$2,400 a year.

The committee approved the recommendation of Secretary Welsh that Fred J. Dell be employed to take charge of the campaign for funds of the Committee of One Hundred, to act as director of exhibits for the association and to be responsible at the association headquarters for carrying on the work of the membership committee. Mr. Dell formerly served as secretary of the old manufacturers' association in 1916, and it is felt that a good share of his salary will be offset by the amount that is now paid yearly to an outside director of exhibits.

Reporting for the committee on national relations, C. L. Henry reported on various activities of the Washington office. He also said that Ralph R. Bradley had prepared a brief for presentation before the Interstate Commerce Commission in the matter of whether the transportation act of 1921 applies to the electric railways, as being engaged in the general transportation of freight, the brief covering the case of the Chicago, North Shore & Milwaukee Railroad as a test.

Progress reports were also presented for the committee on midyear meeting, publicity committee, the committee on company and associate membership and the midyear dinner committee. Consideration was given by President Emmons and the committee to the appointment of the A. E. R. A. committee to take part in the award of prizes in connection with the Charles A. Coffin foundation.

An invitation was received from the Wisconsin Utilities Association to have a representative of the American Electric Railway Association speak before its annual meeting in March. After discussion, W. H. Sawyer was appointed, with J. P. Barnes as alternate.

The executive committee took action on Referendum No. 40 of the United States Chamber of Commerce. The first question submitted was "Do you favor a federal department of education with a secretary in the President's

Cabinet?" The vote on this was "No." The second question was: "Do you favor cniarging the present Federal Bureau of Education?" The vote on this was "Yes." The third question was: "Do you favor Federal aid to the state on the basis of equal financial support from the state in promoting education?" The vote on this was "No."

Proposal to organize metropolitan chapters of the American Electric Railway Association as a means of bringing all electric railway people in any one center into a common organization for the interchange of information and for the fellowship of it was presented to the committee by C. E. Morgan. After some discussion of the subject a motion was passed to appoint a committee to investigate the proposition and the committee named was C. E. Morgan, chairman; J. P. Barnes, F. R. Coates, W. H. Sawyer, C. R. Ellicott and Martin Schreiber.

The committee then took up the discussion of the proposed amendment to the banking act in New York to provide for making public utility securities legal investments for savings banks and other fiduciary institutions. As drawn at present, this amendment would exclude electric traction securities, and it was felt it would be a very unfortunate thing if it went through in its present form. A committee to look into this subject, appointed by President Emmons, subject to their acceptances, are: J. H. Pardee, B. C. Cobb, Randall Morgan, H. L. Doherty and S. Z. Mitchell.

Mr. Henry reported on the presentation to the United States Coal Commission of the brief prerpared by the joint fuel committee of the national utility associations. Mr. Henry said that in appearing before the commission he had suggested that the railroads should not have the power to confiscate coal and said that after consideration the commission seemed to concede the point that railroads should have to store coal just the same as any other industry. He said there was no indication of relief on the price of coal.

The recommendation of the Transportation & Traffic Association that the American Association co-operate with the National Safety Council by joining and giving its full support was approved by the executive committee. The recommendation of the T. & T. Association that a committee be appointed to study employees' welfare work, including pensions, bonuses, etc., was disapproved. The plan suggested by the T. & T. Association that the meetings at the annual convention be condensed into three days, Monday, Wednesday and Thursday, in order to give one day free for visitation at other affiliated association meetings and for studying of the exhibits, was approved. The executive committee also decided to suggest to all the affiliated associations that, so far as practical, they

follow the same plan, presumably staggering the "day off."

The next meeting of the executive committee will be held on Feb. 15, the day before the midyear meeting, in Wash ngton, D. C., at the Hotel Willard. 2:30 p.m.

Those in attendance at this Louisville meeting of the committee were: President C. D. Emmons, C. E. Morgan, L. C. Datz, L. E. Gould, C. L. Henry, Robert I. Todd, J. P. Barnes, W. H. Sawyer, F. R. Coates, A. W. Brady, Leslie Paul for H. B. Shute, Secretary J. W. Welsh, Labert St. Clair and J. W. Colton.

Committee on Location and Exhibits

PRESIDENT C. D. EMMONS announced the appointment of the following committee on location of the next annual convention and exhibits at the last executive committee meeting:

C. E. Morgan, vice-president Brooklyn City Railroad, Brooklyn, N. Y., chairman; George Keegan, Martin Schreiber, A. L. Kempster, D. W. Pontius, H. B. Flowers, E. J. Burdick, J. F. Hamilton, A. T. Perkins, F. G. Buffe, S. W. Greenland, B. J. Fallon, Harry L. Brown, A. M. Robinson, J. C. McQuiston, L. W. Shugg, Thomas Finigan, L. G. Parker, E. B. Meissner, C. L. Van Auken, A. F. Old, John M. High, John F. Ohmer, W. J. Hurburt, W. J. Pine, Thomas Casey, L. J. Drake, A. L. Price and L. E. Gould.

Committee on Company and Associate Membership

EETING in Louisville at the time M of the Central Electric Railway Association convention, the committee on company and associate membership of the American Electric Railway Association began its work for the present year. The very excellent work done by this committee heretofore was reviewed and plans were laid for carrying on the line of endeavor started. Considerable time was spent in going over the list of companies which are prospects for membership in the association, for the purpose of eliminating such prospects as were found upon analysis to be already included under some syndicate membership. It was planned that Chairman W. H. Sawyer would write a personal letter to all the companies who were found from the revised list to be real prospects, to ascertain if possible what chance there was of bringing that company in. Considerable effort is to be concentrated on the many small companies which are not included in the association, to which the association has the most to offer in the way of helpful service. These present at the meeting were W. H. Sawyer, East St. Louis, Ill., chairman; H. M. Wilson, F. R. Coates, E. M. Walker, Leslie Paul for J. C. McQuiston, H. L. Brown for H. H. Norris, E. F. Gould, G. R. Lyman, S. M. Curwen, Secretary J. W. Welsh, Labert St. Clair and J. W. Colton.

Maintenance of Equipment

Discarded Armature Cores Reclaimed

A Specially Constructed Spider Is Used by the Cleveland, Southwestern & Columbus Railway for Reclaiming Armatures Which Otherwise Would Have Been Scrapped

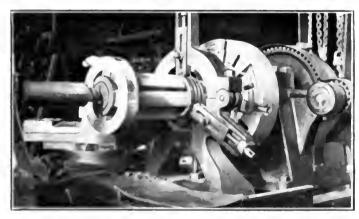
AEMATURE cores that have seen duty entirely satisfactorily in service. a good many years active service and almost as many in discard at for some time with armatures so rethe shops of the Cleveland, Southwestern & Columbus Railway are being given a new hold on life by the use of a new specially constructed This spider, which was spider. largely the design of W. R. Goodnight, master mechanic, makes it possible to use the unworn bearing area in the bore of the laminated The cores were taken out of service because the four ribs of the old spider had worn longitudinal grooves in the bore and consequently the use of a new spider, with its relative position the same as before as determined by the keyway, would not make a tight fit. The new spider occupies a position one-eighth of a turn advanced from that of the first,



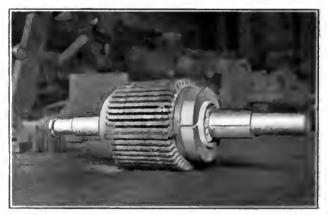
Old and New Type Spiders. Note Special

in place by lugs as the original spiders were built. The continual breakage of these lugs was the reason for making that change. Another improvement is the use of a threaded ring instead of a snap ring to hold the core on the spider. This construction does away with the uncertainty regarding the pressure along the spider holding the core. A third minor change is the cutting of a full length keyway for holding the commutator. This was done to eliminate the trouble incident to setting the commutator when it had to be pressed half way on the shaft before the key was engaged. Much trouble was caused because the commutator would turn enough in being pressed on so that the key and keyway would not line up.

In the accompanying illustration it will be noticed that plates with teeth like those of the laminations were placed on each end of the core. These were used to make a more rigid core and to form a better protection for the windings, since all the teeth on



Machining Specially Designed Spliter for Use with Disearded Armuture Cores



Reclaimed Core, Showing Special Bing for Compressing Laminations and Threaded Instead of Snap Bing

so that the entire contact of all four ribs is along the area formerly untouched. As the keyway in the old spider was cut in one of the ribs, a different method of keying the core to the spider had to be devised. It was done by having the new spider cast with an extra rib of smaller dimensions between two of the main ribs and in it the keyway is cut. To maintain the balance another of equal dimensions is cast in the opposite side.

Cores reclaimed in this fashion have been found to perform their spider. It is not removable and held

expected to reclaim twelve more in the same way at a cost about onesixth that of the price of new laminations. This work has been done on Westinghouse 93, 112 and 304 motors, for all of which the same pattern is used, although there are some minor differences in the machinery.

While the fifth keying rib is the feature of this spider, several other improvements are also incorporated in its design. The plate on the gear end has been cast integral with the

claimed from the scrap pile. It is the laminations near the end were bent out. To make room a few of the laminations had to be removed. of course.

Repairing Worn Controller Shafts

The Sandusky shops of the Lake Shore Electric Railway repair the drum shafts of G. E. C-36 controllers to obtain additional service. This is the type used with multiple-unit equipment and is operated with a small handle that fits over the end of

the handle. This play makes it diffi- screwing at any time.

the shaft and has two small pins cult for a motorman to accelerate his which enter holes drilled in the end car properly. In these cases the end of the controller shaft. These holes of the drum shaft is cut off, the become elongated from use so that shaft drilled and tapped and a new the drum may lag or be advanced a piece screwed in. The joint is pinned notch from the position indicated by to prevent the new piece from un-

Features of the Youngstown & Suburban Cars

Seating Forty-four, They Weigh 28,640 Lb. and Are So Constructed as to Gain Low Center of Gravity-Arranged for One-Man, Two-Man Operation

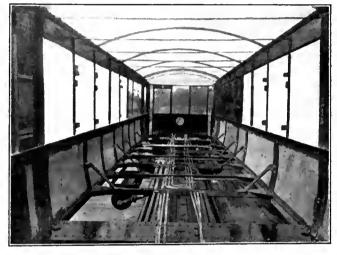
> JOHN A. DEWHURST Railway Engineer Day & Zimmermann, Inc.

NE of the important results omy with safety that came out of the distress of the few years past has been the reversion to lighter weight cars for city and for interurban service. It is of extreme importance that, in gaining the advantages of lighter weight, the factors of safety and comfort are not jeopardized. The automobile, if nothing else, has brought about a desire for greater comfort and greater convenience, and the street railways, as well as interurban railways, must meet this desire or go one step further if they are successfully to compete with the automobile.

There has been much progress in the last few years in the design of lighter weight cars for interurban service. The two cars designed for the Youngstown & Suburban Railway are only an additional step in the general progress of this idea in an attempt to combine greater econ-

and comfort. The cars described in this article were designed and built by the G. C. Kuhlman Car Company in collaboration with the Day & Zimmermann organization and the officials of the Youngstown & Suburban Railway. The tabulation given herein shows the general dimensions of these

signed for either one or two man operation, but have been operated since the beginning of their service as one-man cars, with entire success. They are equipped with the standard safety devices, with airoperated doors at the front righthand side, the doors having a width of 42 in. The motor equipment, consisting of four General Electric 25hp. motors, is mounted on low wheel trucks using 26-in. wheels. This allows the car floor to be of a height that requires only two steps from the ground to enter, a feature which combines a certain degree of comfort in loading and unloading as well as increased speed. Since the cars neces-



Steel Body Framing Showing Curved Side Girder Plates and Light Intermediate Post Construction

cars and the photographs give an illus- sarily had to be double end, it was tration of the construction, therefore necessary to use a reversible seat, only the important new features will and for this reason it was impossible be mentioned. These cars were de- to make them as comfortable as



New Light-Weight, One-Man, Two-Man Cars of Youngstown (Ohlo) Interurban

would be possible if they were arranged permanently.

DETAILS OF BODY CONSTRUCTION

The side panels below the belt rail are curved inwardly to the extent of 34 in, at the floor sill and are constructed of material known as "Plymetl." a product of the Haskelite Manufacturing Company. This is a three-ply wood veneer with a 28-gage galvanized steel sheathing on each side, the three piles of wood and the two layers of steel being firmly held together by a waterproof cement developed during the war for airplane construction. These plates are pressed into the curved section at the time of manufacture. The plates are held together by hot riveting to batten strips extending a short distance are each pressed out of a single sheet These plates are over the edges. further stiffened by a combination of pressed and structural steel pieces extending inwardly and under certain of the seats.

The car roof rests principally on the pier walls at the end of the car,

GENERAL DIMENSIONS AND MAJOR EQUIP-MENT OF THE YOUNGSTOWN & SUBURBAN RAILWAY'S LIGHT-WEIGHT DOUBLE-

TRUCK MOTOR CARS Garneral Dimensions

41 ft. 6 m
30 ft. 10 in
8 ft. 61 in.
42 in.
32 in.
2 (t. 7) in
7 14 7 1
7 It 3 in
44 persons

Major Equipment Trucks ... Brill 27 E 1 — wheel base 4 ft. 10 in Motor equipment ... 4 GE-264-25 hp. motor Cootrol. GE type K Air brake, GE straight air equipment, CP-27 com-

pressor.
Weight, complete ready to run without passenger.
28,640 lb.

these pier walls being stiffened by the side plates surrounding the small windows in the car. No through carlines are used except at the pier walls. The intermediate posts are of very light-weight pressed-steel sections which serve principally as sash supports. They are bolted at the bottom to the belt rail and at the top of the letter panel. The roof itself consists of sections of Haskelite de in, in thickness, which is similar to the Plymetl of the sides except for its thickness and the fact that steel sheathing is not used. The inside of the Haskelite roof is the exposed surface of the ceiling, and the top surface is covered by canvas set in white lead in the usual manner. The center of the ceiling is 7 ft. 3 in. above the top of the floor so that the roof is somewhat lower than has heretofore been customary.

This feature, however, combined with the 26-in, wheel trucks, brings the center of gravity comparatively low so that the stresses thrown on the car body proper are lessened considerably. This, it is felt, will react favorably upon the maintenance of both the ear equipment and the track. The floors are double, and while this adds some to the weight it was felt that the extra strength due to the double floor was an advantageous feature. Over the floor is also placed a 1-in, layer of dark green linoleum.

The car body floor is at practically the same elevation as the platform, there being only a slight 2-in. ramp. Aluminum has been used extensively, there being about 265 lb. in each car. The hoods over the platforms of aluminum and have been found to be satisfactory. The entire seat frame and supports are cast of aluminum so that each individual seat, including the spring cushions and spring backs, weighs only 48 lb. Aluminum is also used for the and electric stanchions heater frames and other smaller parts.

Center lighting has been used and the circuits so arranged that they all lead to the headlight, which consists of the 150-watt concentrated filament type. In this way the usual 80 per cent of loss in the headlight resistance is eliminated.

It is too early to predict how much reduction in ear maintenance will result, but on account of the simplified "K" type of control and the modern features in the balance of the equipment, it is certain that the maintenance will be reduced on the one item of inspection alone. The real test, of course, must come after five or six years of service. Up to the present time the ears have shown no signs of failure which in any way could be attributed to the lightweight feature.

Careful checks have been made to determine the savings in power used for propulsion, and the following tests have been made on one of the old type cars weighing approximately 35 tons and one of the new type weighing 14.25 tons. These readings were taken over exactly the same trackage and during the same day when conditions were entirely similar in either case.

Heavy cars (35 tons) 4.63 kw.-hr. per car-mile Lighter weight cars (14.25

tons) 3.36 kw.-hr. per car-mile If this saving is reflected back to the point of purchase on the assumption of 663 per cent efficiency of distribution, it results in 0.35 kw.-hr. per car-mile in favor of the lightweight equipment.

These ears also accelerate much more rapidly and, of course, with a great saving of energy. This greater speed of acceleration and braking has made it possible to maintain the same schedules with these cars even with one-man operation as previously was maintained with the heavier cars that were capable of attaining speeds 10 to 12 m.p.h. faster. All of these factors tend still further to increase the safety of operation.

It is not felt by the operating officials that this design is by any means the last word in lighter weight construction but that it is a very decided improvement over the ears in service previously, and it has had the effect of producing much needed economies without jeopardizing the passenger riding.

New Equipment Available

Sanding with Water

WATERPROOF sandpaper has been developed by the Minnesota Mining & Manufacturing Company, St. Paul, Minn., which is impervious to either hot or cold water. It is being marketed under the trade name "Wetordry" and it can be used either with or without water.

Some of the advantages claimed for wet sanding are that the water keeps down all dust, thus making the painter's occupation more healthful and also the sand side of the paper is washed clean, thereby keeping the cutting edge of the sand so as to enable much faster sanding, as well as longer life for the paper.

The waterproof sandpaper is made in flint, garnet and artificial mineral, and in grits ranging from velvety fine to coarse. For best results the manufacturer recommends using the paper wrapped around a felt pad when used on varnish, and when sanding rough stuff the paper can best be attached to a rubber block. The company also furnishes a varnish pad and rough stuff block for convenient use of the sandpaper. These pads are designed in such a manner that the operator's hand is kept completely away from the abrasive grain.

The News of the Industry

Merchants Favor Transit Commission Plan

The Merchants' Association of New York has approved the conclusions contained in a study of the local transit situation which was made by the committee on city affairs of that body. The association declares that the city's transit needs will be best served by a unified transit system with interconnecting lines affording direct movement between all parts of the city for a single fare. The report of the committee includes an analysis and comparison of plans that have been proposed for extending present transit system. It is the belief of the association that the city's unaided financial resources are not sufficient to enable it to provide funds for adequate new subway construction, or to acquire by direct purchase or recapture existing subway and elevated

In finding that the various public improvements for which the city has mortgaged its resources have brought the city dangerously close to its debt limit, the report disapproves of the plan announced by the Mayor which calls for municipal ownership and operation of a \$618,000,000 system, and expresses general approval of Transit Commission plan contemplating transfer to city of title to existing roads in exchange for securities guaranteed as to return. Necessary subway construction, it is asserted, can be financed only by placing on a self-supporting basis the city's present \$250,000,000 subway investment, thereby releasing that sum from the debt limit. It is proposed to accomplish this by continuing present investment of private capital on the basis of reduced but definitely assured return, and by abolishing existing "differentials" in favor of the companies.

Provisions of the Transit Commission plan for abandoning certain surface lines and rerouting others is approved, but the committee is strongly of the opinion that this process should not be carried on to the extent advocated by the Mayor's plan which urges scrapping of all surface lines in favor of motor buses. The latter mode of transportation is believed to play an important part in transit situation by acting as feeders to rapid transit lines in outlying districts. Buses, it is held, cannot advantageously displace surface cars.

Bacharach Pushing His Bill

Representative Bacharach of New Jersey is making strenuous attempts to have the sub-committee of the judiciary committee of the House, of which Representative Graham of Pennsylvania is chairman, report out the so-called Bacharach bill, which would limit the jurisdiction of United States courts in

cases relating to the making of rates by public utility corporations.

Mr. Bacharach has addressed a letter to members of the House, urging them to bring pressure to bear on the judiciary committee to report the bill, and calling their attention to the support that the bill has received from the Governors of many states and the regulatory commissions of many other states. It is to the members of the House from these states especially that he appeals.

Representative Bacharach has promised Governor Silzer of New Jersey, who has interested himself in the bill and who had much to say on the subject in his inaugural message, that if he finds he can not obtain action on the Bacharach bill he will offer in the House a substitute bill which has been prepared by Governor Silzer and attempt to obtain passage of the Silzer bill.

Governor Silzer first proposed the substitute bill to Mr. Bacharach last August, but at that time Representative Bacharach felt he could not introduce it, because he said he did not desire to weaken the support of the Bacharach bill by offering another bill on the same subject. Governor Silzer and Mr. Bacharach have now had further correspondence on the subject.

Railway Improvements Depend Upon Public Co-operation

Answering recent attacks on the inadequacy of the service provided by the Chicago Surface Lines, Williston Fish, general manager, states in the Daily News of Jan. 16 that the company under staggering difficulties is trying hard to handle its job and he believes that the results have been as good as Chicago could expect. Financial burdens and political antagonism have been hindrances to improvements in the opinion of the general manager. He reviewed the history of the warfare between the city authorities and the management of the surface lines saying that the present standstill dated back to 1915, the year Thompson first took office as Mayor. He said that the city's position that the cars have no rights in the streets had done more than involve the companies and present extensions, but had hurt the system's credit and impaired the sale of securities. The surface lines first mortgage bonds are now quoted around 772. He said that any banker would say that no capital improvements would be financially justified under these conditions.

In concluding his remarks Mr. Fish said:

Give the companies a chance by helping them instead of fighting them. Permit unification of service with supplementary subways. Then Chicago will have the best transportation in the world.

Municipal Railway Would Lease Cars Under Option to Purchase

Pointing out that more than one-half of the street cars now operated by the Seattle (Wash.) Municipal Railways have become unjustifiably expensive to operate and maintain, through long usage, an ordinance has been introduced in the City Council providing for the lease, with option of purchase, of from 100 to 200 new fifty-eight-passenger The ordinance points out that since the city has not accumulated a replacement fund sufficient to purchase cars urgently needed, economy of operation makes it advisable that the city lease the cars needed, with option of purchase at the end of each twelvemonth period, purchase of the cars to be made from the earnings of the street railway system.

If the ordinance is passed, the Board of Public Works is authorized and directed within thirty days to adopt plans and specifications for the new street cars, obtain bids and award the contract. No less than 100 nor more than 200 cars are to be leased. Three alternate proposals must be submitted by bidders to cover leases for periods of sixty months, eighty-four months and 120 months respectively. New lightweight, low-floored cars are to be specified, with double trucks, center and end entrance and exit, single end control and capable of being operated by one or two men.

If it is decided to purchase the cars at the end of the sixty-month lease, the purchase price is limited to \$3,000 each; at the end of eighty-four months, \$2,000 each, and if the cars are not bought until after 120 months, \$1,000 each is the maximum price that can be paid. It is claimed that the plan, if it can be worked out, will effect a new saving in railway operating expenses of from \$150,000 to \$300,000 a year.

Commission Takes Over Operation of Railway

The South Carolina Railroad Commission has taken over the railway lines of the South Carolina Gas & Electric Company at Spartanburg for operation. The city has been without railway service for several weeks. The commission plans to supervise operation of the railway system temporarily to learn whether the road should be kept in full operation. It will be recalled that the company sought permission from the city to discontinue certain non-paying lines and substitute service by bus, but the city did not react favorably to this proposal. The railway is indisposed to keep in regular operation lines that do not give prospect of being able to pay their own wav.

Steel Cars Sold

A mutually advantageous arrangement has been made between the Beaver Valley Traction Company, New Brighton, Pa., and the Pittsburgh Railways whereby the former will sell to the latter twelve low-floor center-entrance steel cars which have been in use for the past six years. Six of the cars will be delivered immediately and the remaining six within a few weeks.

W. H. Boyce, general manager of the Beaver Valley Traction Company, said that there were several reasons why the sale was consummated. On this point he said:

First, we were offered more money than we paid for these cars six years ago. Second, we are in need of ready cash; third, these cars are better suited to Pittsburgh than Beaver Vulley operating conditions. There the streets are better drained and consequently the electrical equipment, which is mounted very low on these cars, does not suffer from water and show damage as it does here. There the cars operate entirely over paved streets and they do not experience the difficulty that we do of having a lot of dust and dirt sucked in through the doors and car floor.

It is the intention of the Reaver

It is the intention of the Beaver Valley company to overhaul its doubletruck wooden cars and to change over to one-man cars at least six of the present double-truck cars. Several manufacturers have been asked for prices on the latest double-truck one-man cars to be equipped with all the latest safety features. The company hopes to purchase six of these for a small payment down and pay the remainder in installments. Mr. Boyce said that as things had been going for the last two years the company must reduce its operating expenses by the installation of the oneman car if it was to continue to operate.

The deal between the two properties had to be closed at once as the Pittsburgh Railways is in need of additional cars and the receivers had just received the approval of the court for the purchase of additional cars.

Holding Company May Finance New Construction

Plans are being prepared by the Buffalo & Lake Eric Traction Company to hulld an extension in Eric, Pa., which will provide transportation facilities for the new annexed section southeast of the old city and will form the second and longest belt line operated by the traction company.

It is said that the company will be unable to finance the extension from State Street to Thirty-eighth and it is proposed to form a holding company which will install the extension and lease the line to the traction company until the Buffalo & Lake Eric Company can assume title to it.

It is understood that the traction officials are willing to assume the full cost of constructing a track in Thirty-eighth Street from State Street to connect with the double-track line in Water Street of Wesleyville provided a holding company can be organized to install the spur from its present terminal at Twenty-sixth Street to the old Mill or Cooper Road.

Since the annexation proceedings of

1920, when the area of the city was about doubled, there has been considerable agitation for a general extension of the lines of the street car company in the new outlying districts, which at the present time are without electric transportation facilities.

Preliminary plans for the proposed improvement are to be completed this year. It is expected that actual operations will be started some time during 1924. At the present time the traction company is engaged in reconstructing the present equipment for one-man operation.

Drastic Program Reported in New York

According to a dispatch from Albany to the New York Times dated Jan. 21 the present Public Service Commission in New York is doomed, and when it goes out of existence all its works will go with it into desuctude. This is the tenor of all the other dispatches of the same day to the New York City newspaper.

In the matter of public utility regulation and control, says the Times, each municipality, under the Governor's plan, will be master of its own house. It is not even certain that municipalities in a mood to shirk this new responsibility will be permitted to do so. Originally it was intended that any municipality could by resolution of its Common Council or corresponding legislative body return to the State a power thus universally bestowed. Since then opposition to this particular proposal, as liable to bring about chaotic conditions, has made itself felt at the Capitol. Thus far the original thought has survived in drafts of the legislation that have been prepared, but it was stated recently that in the final revision this tentative provision may be scrapped.

If the program goes through as reported by the *Times* all 7, 8 and even 10-cent fares granted by the Public Service Commission will be wiped out automatically.

As far as it has been worked out to date the Democratic program is to find expression in five bills. These are as follows:

1. The New York City transit bill glying the Hylan administration full and complete authority to deal with transit and buses. This measure is completed in its first draft and is being revised by the Hylan and Hearst representatives, with John II. Delancy in charge.

Hearst representatives, with John II. Delaney in charge,

2. The State Public service act which will repeal the Miller transit law dealing with public utilities outside of New York City and with gas and lighting companies in this city.

3. A state-wide municipal ownership bill.

 A state-wide municipal ownership bill, companion to the second measure, and conferring on cities authority now vested in commissions.

I. A separate municipal ownership bill

5. The hydro-electric power development act, dealing with the state's water power on the same basis as the administration purposes to deal with transit and other utilities.

On Jan. 26 Governor Smith went into detail in the matter of his ideas on home rule in correspondence with Everett P. Wheeler.

Texas Interurban Seeks Franchise

The Texas Interurban Railway, which is now electrifying the Missouri, Kansas & Texas Railway Company's line from Dallas to Denton and will operate it as an interurban line, has filed application with the city commission at Denton, Tex., asking for a franchise covering the entry of the line into that city. Franchise covering the operation of the line in Denton County outside the city limits of Denton has already been obtained from the County Commissioners' Court.

The application filed with the City Commission seeks a forty-year franchise, and was presented by R. B. Hincks, as general attorney, and B. R. Brown, chief engineer, for the Texas Interurban Railway.

Route of the line into Denton is set out in the franchise asked, as over the tracks of the Missouri, Kansas & Texas Railway and onto the Texas & Pacific Railway Company's tracks to a point about 125 feet north of the present Texas & Pacific passenger station. There the interurban line would leave the tracks of the steam railway, and a new track would be built on East Oak Street to Ash Street, about 200 feet from the public square. Here the line would terminate and the Texas Interurban Railway would establish freight and passenger stations.

Announcement was made by Engineer Brown that actual construction in Denton will begin as soon as the franchise is granted. The work of electrifying the line is going forward and is expected to be completed by July.

Paving Question a Local Issue

Recommendation will be made to the joint legislative committee on taxation and retrenchment by the New York State Conference of Mayors that the question of how much paving shall be paid for by traction companies be left to the governmental agencies in the various cities of New York State.

This recommendation will be made to avoid "endless litigation, misunderstandings and bickerings." Under a State law the traction companies now have to pay the cost of paving between their tracks and for 2 ft. on either side. The railways contend that the law imposes an unjust burden on them. The Mayor's report says:

Each city should be permitted to solve its own problems according to its peculiar local conditions. Moreover, under the broadening powers of local self-government, certain principles have been established which conceded the right of the city through its local segislative body to control the use of its streets by the granting of franchises. It is therefore the only logical body which should determine for how much damage to its pavements the street railway is responsible.

The committees were appointed and the conference was held at the suggestion of Senator Frederick M. Davenport, chairman of the joint legislative committee on taxation and retrenchment, who has intimated that he believes the present law imposed an undue burden on the traction companies and that some compromise plan could be worked out to the satisfaction of both the cities and the companies.

More Measures Affecting Utilities Introduced at Albany

Among the bills recently introduced in the Senate at Albany, N. Y., are measures to:

Amend Public Service Commission law, so as to take away from Public Service Commission exclusive power of fixing the number of passengers that may be carried on any street car operated in certain cities. Permit cities to regulate service and fix rates for certain public utilities.

Amend Buffalo charter so as to authorize city to examine books and papers of persons or corporations operating public utilities within city limits.

Empower cities to institute actions involving rates, fares charges or service or issues of stock or other forms of indebtedness of public service corporations operating in whole or in part within city limits, and making in actions not instituted by the city, such city a necessary party thereto.

Permit any first or second class city

were made by city and chamber of commerce officials. At Terrell, which is 31 miles east of Dallas, the present end of the line, a large delegation from points in Van Zandt County and Tyler joined in the speaking and renewed the boom that they have been incubating for extension of the line to Tyler, a distance of about 70 miles east of Terrell.

The new line is the first of the two electric interurban lines to be built by the Texas Interurban Railway out of Dallas. Richard Meriwether, vice-president and general manager of the Dallas Railway, is also general manager of the new interurban line.

Socialist After Utility Information

The Wisconsin State Senate has ratified an Assembly resolution introduced by Assemblyman T. M. Duncan, Socialist of Milwaukee, requesting the Wisconsin Railroad Commission to furnish the Legislature complete information

Serious Accident Stirs Up Grade Crossing Talk

The need for the elimination of grade crossings or the establishment of gates or guards at every grade crossing of electric and steam lines in Louisville, Ky., was emphasized in Louisville at 6.45 o'clock on Jan. 18 when a Louisville & Nashville Railroad switcher smashed into a Twelfth Street car of the Louisville Railway, at the Ormsby Avenue intersection. The car was turned completely around, thrown against two telephone poles and demolished. Eight persons on the car at the time were injured. Seven were only cut and bruised and their injuries are not serious. The motorman-conductor of the one-man car suffered a fractured skull, but is recovering.

Reports indicate that there was no bell or warning and that those on the car suddenly saw the engine just as it The track is straight at this point and it is said that there was nothing to interrupt the view. The conductor-





Destruction Wrought by Steam Engine Smashing Into Street Railway Car at Grade Crossing in Louisville, Ky.

to investigate public utilities operated wholly or in part within its boundaries, to hear complaints against service and to enact ordinances affecting such utilities, to establish bureaus of public utilities and to investigate books thereof.

The bills introduced in the Assembly included the measures to:

Prohibit Aldermen or Board of Estimate to grant franchise to construct or maintain an elevated railway in Manhattan or Kings boroughs.

Amend chapter 788 laws of 1917 relative to removal of Manhattan Railway structures at Forty-second Street, New York City, by providing for extinguishment of all rights in said structure, or to maintain same and assessing cost thereof.

Require use of steel cars on elevated and underground railroads in New York City. Change from cars not steel to steel must be made within one year.

Interurban Line Opened

The new interurban railway between Dallas and Terrell, Tex., was opened to traffic on Jan. 14. The day preceding a large party of Dallas business men guests of the management of the road, visited the towns on the line and at three principal points several addresses

regarding financing of public utilities in the State and pointing out that privately owned public utilities in the State have not paid off any bonded indebtedness in fifteen years. The information requested is as follows:

1. The total of outstanding bonds on Wisconsin public utilities.
2. The approximate annual interest required by these bond Issues.
3. The total of outstanding stock issues on Wisconsin public utilities.
4. Approximate annual dividends paid on such common stocks and preferred stocks.

stocks.

5. Whether the Railroad Commission expectation of the commission of the com pects Wisconsin producers to meet this annual interest and dividend charge forever or whether the commission has any plan in mind to eliminate this tremendous public utility tax.

In a preamble the resolution declared:

The Rallroad Commission since 1907 has regulated privately owned utilities in this State, and in all these years not a single public utility has made any progress toward paying off its Indebtedness. This constantly increasing indehtedness with its ever-growing demand for more dividends is a tremendous annually increasing tax upon the workers of Wisconsin. No municipality is granted a license whereby it may escape paying off its indebtedness, but on the contrary, each city and county is compelled by law to redeem its bonds within twenty years from the date of issue.

The information will be used by the

The information will be used by the Socialists in drafting a bill which will be designed to make the retirement of bonded indebtedness by utility commissions compulsory within a certain period of time.

motorman is unable to talk and the engine crew and the yard conductor have refused to talk.

President Barnes of the Louisville Railway was talking to members of the Central Electric Railway Association in the lobby of the Seelbach Hotel when the Louisville correspondent of the ELECTRIC RAILWAY JOURNAL showed him photographs of the wreck. Mr. Barnes remarked that it was one of the worst torn up cars he had ever seen and that he was really surprised that no one was killed. Other members of the Central Association expressed surprise that any one came out alive.

Mr. Barnes pulled a newspaper from his pocket and referred to an item in which it was said that Councilman Petty had sent a formal request to Mayor Quin asking that the city proceed at once to force the railroad to take steps to safeguard the lives of trolley passengers.

This item appeared directly under a heavy typed heading, which carried the wreck stories in the afternoon paper, on the front page. The accident brought out forcefully the need of greater protection at crossings in the city of Louisville, not only for street railway operation but for general vehicular and pedestrian traffic.

Committee Favors One-Man Cars

Declaring that one-man cars have enabled the companies to render more frequent and safer service, that they have reduced the operating expenses, making it possible for some lines to continue which otherwise would have had to abandon service and others to escape receiverships, and that they have helped platform men to earn a higher average rate of wage, the public utilities committee of the Philadelphia Chamber of Commerce has handed down a decision in favor of the oneman cars. The committee, composed of expert engineers and public utility men. made an investigation in 136 cities operating 7,000 cars of this type. The committee through its chairman, William P. Barba, says that there are still some problems to be overcome in the operation of the one-man car. In part the opinion follows:

opinion follows:

The data obtained by this committee show that one-man cars are in very general use in 136 cities of the United States—in many of these cities on virtually all routes. In the larger cities the use seems to be confined more generally to use as ferders to main trunk lines and in serving the more sparsely settled sections, but in the smaller cities the one-man trolley is used throughout for all classes of service and apparently with great satisfaction. It is the opinion of your committee, however, that in a city the size of Philadelphia the proper field for the operation of one-man trolleys is probably going to be found in their use as feeders to trunk lines and as full-service use in the less densely settled portions of the city.

It is probably unnecessary to point out the great interest which the public has in extending the use of one-man cars so far as it is compatible with the situations which we have outlined above, because in most instances, if one-man trolleys are not put into use, either the section will do without transportation or will have to put up with the use of one-man bases or fitneys, either of which introduce hazards and nicertainty not possessed by the one-man trolley with its more regular schedule of operation.

Unless such use of one-man trolley is permitted and encouraged, alternatives are the use of less safe one-man bases or the complete abandonment of such service to such communities.

Asks Probe of Alabama Property.— Gov. Thomas E. Kilby sent a special message to the Senate and House recently asking for appointment of a special commission to probe into the valuations of the Alabama Power Company, Birmingham, Ala., declaring "the public has rights and privileges in the matter of rate making, which the state laws must protect."

May Again Operate Line.-The people of Goldshore, N. C., will vote in about six weeks to decide whether the city will put the street car system of the city in operation again. The city has about \$35,000, which was realized from the sale of the old power plant ten years ago. It has been holding this money ever since the sale as a sort of trust fund. The proposition to be voted upon is whether the city will take this \$35,000 and rehabilitate the street car system and put it into operation.

Must Accept Cut.-As a result of a decision of the trustees of the Boston (Mass.) Elevated Railway, employees must accept the 2 cents an hour reduction in their wages, effective Jan. 1. The carmen had petitioned for a deferment of this wage cut on the ground that living costs had gone up since last

July, when the joint agreement reducing the wages had been entered into. With the cut in effect, the motormen and conductors will receive a wage scale of 61 cents an hour.

Retiring Governor Makes Recommendations. -- Among recommendations in his message retiring Governor Taylor of Tennessee recommended the consolidation of state departments reducing the number to eight. Curbing powers of the State Railroad and Utilities Commission, especially as to control of local affairs and repeal of the eight per cent interest laws. The members of the Legislature have since endorsed Gov. Taylor by telegraphic message for Secretary of Interior, though it is stated Gov. Taylor is not an applicant.

Ford Solves the Electric Railway Problem .- In some comments which he made recently Mr. Ford said that the managements of the electric railways should not increase their charges but lessen them. He advised the new Mayor of Detroit to begin his career by cutting in half the fare charged by the Detroit Municipal Railway. His idea is that every possible economy should be resorted to rather than interfere with what he regards as the life of the system, namely, its cheapness. He said: "People would find they could ride the cars so cheaply that tens of thousands who new drive to and from work would ride the street cars-the saving would be considerable, they could not afford to drive."

Foreign News

At a meeting of Glasgow Town Council on Nov. 16 a special committee presented a report recommending:

1. That when the sanction of Parliament has been obtained to the purchase hy the Council of the Glasgow subway railway the work of electrifying the system (now worked by cable haulage) be carried out by contract.

2. That with a view to the work of electrification being put in hand as soon as possible after Parliamentary sanction has been obtained, schemes and quotations be now invited from firms capable of carrying out the work.

Some labor members moved to have the matter remitted back to the committee for consideration of the expediency of having the work done by the Glasgow tramway department under the direction of the general manager. Lord Provost Paxton said that the general manager did not want the job, as it was in a great measure of a nature new to the department and the general manager would prefer to get offers from contractors. The committee's recommendation was carried by fifty-eight votes to thirty.

The Glasgow tramway committee has approved the acceptance of a tender by the Cargo Fleet Iron Company, Middlesbrough, for the supply of 4,200 tons of steel rails, with fish-plates, at the price of £41,000. An offer by a German firm was £5,000 lower and one by a Belgian firm £4,000 lower. It was stated that the quality of the British steel was superior to that of the foreign.

From a tramway operating point of view a decision of the highways committee of London County Council to drop for the time being the use of trail cars on the Embankment-Tooting-Wimbledon route is of interest. Instead of having trailers coupled to the motor cars during the rush hours, more electric cars are being run. According to a statement by the chairman of the highways committee, the change is an experiment. Thirty-four trailers have thus been put out of service on the route. Some of the London daily newspapers stated that the object was to provide shelter from the weather for all passengers, as the upper decks of the trailers are open to the air, while the upper decks of the motor cars are roofed salons. Another reason, and apparently the real one, is that the Wimbledon Borough Council objected to the use of trail cars in the narrow streets of Wimbledon. The whole matter is of much interest because some years ago the County Council. after a fierce Parliamentary contest, in which the opponents were the Metropolitan police authorities, obtained authority to use trail cars. That was considered a great victory for the Council and for tramway passengers. The trailers have proved very useful.

MUNICIPAL LINES REDUCE FARES

One of the reasons assigned for installing still more powerful motor cars recently on various routes in London was to enable the cars to maintain the same speed with trailers as the older motor cars showed without trailers. Probably more will be heard about this matter. In any event, trailers continue to be used on other routes.

The London County Council has decided on certain fare reductions. Workmen's fares are reduced to the following: Not exceeding four sections, 2nd. return (approximately total distance 4.8 miles); exceeding four and not exceeding eight sections, 4d. return; exceeding eight sections, 6d. return. On ordinary fares only one reduction is made. That is that between 10 a.m. and 4 p.m., when the 2d. fare for any distance beyond the 1d. stage is in operation, the length on the penny stage will be increased from 1.2 miles to 1.8 The committee expects that miles. there will be some reduction in revenue as a consequence, but not sufficient to prevent a small surplus being realized on the present year's working. The reason why a more favorable financial result is expected than in last financial year is that though there has been a heavy falling off in receipts, largely due to bad trade, there has been a great reduction in the cost of labor and materials.

Financial and Corporate

December Surplus \$32,176

Statement of Toledo Property Reflects
Good Conditions—Improved Service and Operating Economies
Expected in 1923

A surplus of \$32,176 was the result of operations of the Community Traction Company, Toledo, Ohio, during December of last year. This amount remained after all operating expenses, taxes, repair bills and interest charges had been paid and \$17,708 added to the municipal ownership fund. The surplus was placed in the fare stabilizing fund, which once was almost depleted on account of losses. The amount in the stabilizing fund now is \$204,707.

The latest credit to the stabilizing fund is the largest, by almost \$11,000, that has heretofore been available. Compared with the credit from December, 1921, operation of \$11,419, in which month a power credit of \$15,500 and a lower maintenance allowance were reflected, it would seem fair to assume that Toledo is well on the way to a return of normal business conditions. This conclusion is supported by a material increase in the daily average revenues for the present month.

During the year 1923 it is proposed to spend on maintenance \$640,000, as against a similar expenditure during Further, the maxi-1922 of \$497,835. mum depreciation allowance will be set up, making available in that fund the sum of \$127,500, as compared with a total credit for the year 1922 of \$42,500. Through these two items additional expenditures this year \$227,165 will be made on the maintenance and replacement of track and The result should reequipment. flect savings in other items of operating expense and permit of improved service and operating conditions, Commissioner W. E. Cann said.

The city has just bought \$112,000 more of the bonds of the company for delivery Feb. 1. The total stock and bond ownership of the company ac-

quired by the city will then amount to \$367,000 and there is \$30,000 more in the purchase fund deposited on interest in a bank.

Gross earnings and operating expenses for December are respectively \$347,846 and \$191,494, as compared with \$323,500 and \$184,479 for December, 1921. Fixed charges, including interest and dividends, amounted to \$124,177 in December, 1922, and \$127,602 in December, 1921.

During the month there were carried 5,475,825 revenue passengers, or an average of 176,614 a day, as compared with 5,009,197, or an average of 161,587 a day, in December, 1921. Car-miles operated—653,710—represent an increase over the same month of the previous year of 23,859.

The ratio of operating expense to gross income of 67.275 per cent compares favorably with a ratio of 68.167 a year ago.

The board authorized the commissioner to ask the Council's approval of an allowance of \$25,000 for the maintenance of the commissioner's office for the coming year.

The term of Henry Truesdall, chairman of the board of control, expires on Feb. 1. He served in that capacity for two years.

November Result Good

The North American Company, New York, N. Y., has made a good showing for the twelve months ended Nov. 30. 1922. At the close of that period the net earnings were equal to more than \$24 a share on the common stock outstanding. This compares with \$22.75 a share on the 400,518 shares of stock outstanding for the twelve months ended Oct. 31; \$22.67 a share on the 378,958 outstanding common shares for the twelve months ended Sept. 30, and \$19,35 a share earned in the 1921 calendar year on the 300,664 shares of common stock outstanding on Dec. 31, 1921. It is believed likely that the com-

mon cash dividend distribution will either be increased or an extra payment made to the stockholders during the coming year as the result of a favorable outlook.

Hopes for Operation Abandoned

Efforts have been abandoned which were made by persons living along the Springfield, Troy & Piqua Railway, Springfield, Ohio, recently sold for junk to the Schonthal Company, Columbus, to purchase the line between Christiansburg and Troy, and keep it in operation. Troy and Casstown committees failed to raise their quotas. The \$30,000 option expired at midnight Jan. 19 without action being taken.

A. J. Bright, Christiansburg, head of the main committee, said that Christiansburg had raised \$12,000 of its quota of \$15,000, but that Troy and Casstown had subscribed but \$3,000 each, with no prospects of increasing the amount. Hence efforts to buy were dropped.

Acting for the Schonthal Company, W. G. Bell, resident manager at Springfield, Ohio, in accordance with instructions of Federal Judge John E. Sater, is settling claims out of the funds paid by the Schonthal Company for the properties.

The sum of \$23,878.50 was refunded to persons along the line who had sought to refinance the entire line and keep it in operation but who had failed in their purpose. Taxes amounting to \$4,702 to Champaign County, \$5,913 to Miami County and \$9,222 to Clark County were paid. Cost of administration amounted to \$6,900 and receiver's certificates \$19,240, while other minor claims are also being met.

Detroit Net Income Lower

For the thirty-one days ended December, 1922, the city of Detroit Department of Street Railways realized a net income of \$47,271. against \$91,768 for the month preceding. There was an increase in the total operating expenses, \$1,107,092 being checked against November, 1922, and \$1,213,884 against December. The total number of passengers carried increased from 37,103,301 in November to 38,258,194 in December.

	atest	Month Ago	Year Ago	Peak	1913			Latest	Month Ago	Year Ago	Peak	1913
Street Rallway Fares*	Jan. 1923 6.94	Dec. 1922 6.96	Jan. 1922 7.20	May 1921 7.24	4.84	Conspectus	Eng. News-Record Construction costs	Jan. 1923 191.7	Dec. 1922 192.6	Jan. 1922 168.7	June 1920 273.8	100
Street Rallway Materials*	Dec. 1922 174	Nov. 1922 174	Dec 1921 159	Sept. 1920 247	100	Index es	U.S. Bur. Lab. Stat. Wholesale Commodities	Dec. 1922 156	Nov. 1922 156	Dec. 1921 140	May 1920 247	100
Street Rallway Wages*	Jan. 1923 207	Dec. 1922 208	Jan. 1922 213	Sept. 1920 232	100	Jan., 1923	Bradstreet's Wholesale Commodities	Jan. 1 1923 13.70	Dec. 1 1922 13.78	Jan. 1 1922 11.37	Feb. 1 1920 20.87	9.21
Steel Unfilled orders (Million tens)	Dec 31 1922 6.75	1922 6.84	1921 4.27	1917 12.18	5.91	Compiled for Publication in this Paper by	Dun's Wholesale Commodities	Jan. 1 1923 185.6	Dec. 1 1922 185.5	Jan. i 1922 164.4	May i 1920 263.3	120.9
U.S. Bank Clearings Outside N. Y. City (Billions)	Dec. 1922 14.94	Nov. 1922 13.56	Dec. 1921 12.93	March 1920 18.54	Av. Mo. 1913 6.12	Albert S. Richey Electric Ballway	U.S. Bur. Lab. Stat.	Dec. 1922 147	Nov 1922 145	Dec. 1921 150	June 1920 219	100
Business Failures Number Liabilities (millions)	Dee. 1922 1,851 45.84	Nov. 1922 1,758 54.0 ₈	Dec. 1921 2,427 81.43	Jan. 1922 2.722 105.7	Av. Mo. 1913 1,213 24.64	Engineer Worcester, Mass.	Nat. Ind. Conf. Bd. Cost of living	Dec. 1922 158.9	Nov. 1922 158.4	Dec. 1921 162.7	July 1920 204.5	(1914) 100

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over, except New York City, and weighted according to population. Street Railway Materials index is relative average price

of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages Index is relative average maximum hourly wage of motormen and conductors on street and interurban railways in the United States. †Revised weighting.

Equipment Trust Certificates of P.R.T. Offered

The Philadelphia Rapid Transit Company has sold to Dillon, Read & Company, New York, N. Y., an issue of \$4,750,000 51 per cent equipment trust certificates, Series G, which were offered for subscription on Jan. 23 at prices to yield from 5.20 per cent to 5.50 per cent. The par value of the certificates will represent approximately 74 per cent of the total cost of the new equipment, for which the proceeds will be used. This will include 520 standard double-truck closed vestibule passenger ears, 34 double-truck snow plows and sweepers. 20 double-truck construction and repair cars and two crane construction cars. This equipment is to be constructed at a cost of \$6,500,000. The trusts are due in semi-annual installments from Feb. 1, 1924, to Aug. 1, 1933.

House Passes Tax-Free Bond Measure

The House of Representatives on Jan. 23 passed the joint resolution proposing an amendment to the constitution of the United States intended to prevent the issuance of tax-exempt securities. The belief is quite general on Capitol Hill that the approval of the joint resolution cannot be secured at this session of congress in the Senate. This would have the effect of allowing the legislation to die with the session of congress which ends March 4, thereby making it necessary for the House of Representatives to reconsider the measure at the next session. Even were the Senate to pass it before March 4, many are of the opinion that great difficulty will be experienced in securing the ratification of the amendment by two-thirds of the States.

\$4,533,411 Loss by New York Roads in 1921

The accompanying table showing the result of electric railway operations in New York State outside of New York City was contained in the report presented by the Public Service Commission to the Legislature. It covers the earnings of these companies for the years 1919, 1920 and 1921. Other phases of the report of the commission

were reviewed in the ELECTRIC RAILWAY JOURNAL for Jan. 13. The commission has pointed out that the total dividends paid during the year 1921 by all electric railroads in the State was \$419,659. This would represent a return of 6 per cent on an investment of only \$7,000,000, as compared with the book values of these plants as reported to the commission, and in many instances fixed by this and prior commissions in rate and capitalization proceedings, amounting approximately to the sum of \$250,000,000.

Increases Capital Stocks.—The Groton & Stonington Traction Company, operating between Groton and Stonington, Conn., has recently increased its capital stock from \$50,000 to \$481,000. The increase is taken care of by the issue of 4,310 shares valued at \$100 each.

Increase in Net Income. -The Brooklyn (N. Y.) City Railroad for the six months ended Dec. 31, 1922, reports a net corporate income of \$985,070 against \$689,885 for the same period in 1921. The passenger revenue increased from \$5,654,453 to \$5,849,254 for the six months ending December, 1922.

Mortgage Notes for Sale.—Stone & Webster, Boston, Mass., are offering \$400,000 of two and one-half year 6 per cent mortgage notes of the Kcokuk (Iowa) Electric Company. The price is 98½ and interest to yield 6.65 per cent. The notes are dated Jan. 2, 1923, and are due July 1, 1925.

Service Will Cease.—The Dominion Power & Transmission Company has notified the town of Dundas, Ont., that the railway service on the Hamilton & Dundas Street Railway will cease on Jan. 31, 1923. The reason given is that the line is bankrupt and the service for a few years past has been carried on at a loss.

Reappraisement Hearings On.—Hearings are taking place in Duluth, Minn., before the Wisconsin Railroad Commission for reappraisement of the valuation of the Duluth-Superior Street Railway. At the hearing on Jan. 10 Herbert Warren, general manager of the Duluth Street Railway, was the first to be questioned. He was asked about the amount of fare for car passengers and about motors, vehicles and

bridge tolls. Statements were presented showing cost of operation since Aug. 1, 1922.

Wants Bond Canceled.—W. H. Hitchcock, local manager at Keyport, N. J., of the Jersey Central Traction Company, has petitioned the Middlesex County Board of Freeholders for the cancellation of a bond for \$10,000 given by the company in 1903 as a protection to the county in the repair work being done on the Morgan bridge at that time. The matter is under advisement.

Officers Elected.—R. S. Hecht and A. L. Kempster have been re-elected president and vice-president and general manager of the New Orleans (La.) Public Service Inc. All the directors and officers of the company were re-elected, in addition to E. T. Colton, who was attached to the engineering department of the Board of Port Commissioners. He was made assistant secretary and assistant treasurer.

Increase in Net Income. — For the twelve months ended Dec. 31, 1922, the Philadelphia (Pa.) Rapid Transit Company reports a net income of \$1,829,278, against \$1,807,293 for the twelve months ended Dec. 31, 1921. There was an increase in traffic from 836,547,351 passengers in 1921 to 848,883,512 passengers in 1922. The passenger revenue for 1922 amounted to \$41,758,763, against \$41,514,830 in 1921.

Line Reported Sold.—The line of the Five Mile Beach Electric Railway, operating between Anglesea and Wildwood Crest, N. J., has been sold to a resident of Wildwood, according to a report in financial circles. The line was formerly owned by the West Jersey Electric Company, which also operates the electric light plant at Wildwood. It is said that the new owner proposes to extend the trolley line to Cold Spring Harbor as soon as business conditions warrant it.

North American to Consolidate Subsidiaries.—The North American Company, which recently obtained control of the East St. Louis & Suburban Railway, is seeking to unite the utilities into one company. It is proposed also to include the Cahokia power plant, now under construction by the Union Electric Light & Power Company, with capital supplied by the North American Company. The new company will be known as the Union Electric Company of Illinois and will have an authorized capital of \$13,000,000 common and \$25,000,000 preferred stocks.

Unsold Bonds Will Be Available,-The financial statement of the Rapid Transit Commission, Cincinnati, Ohio, for 1922, shows that bonds totaling \$3,930,000 were sold of the authorized \$6,000,000, leaving \$2,070,000 unissued. This balance includes \$500,000 which Mayor George P. Carrel refused to sign. In his report Frank Krug, engineer for the commission, said these bonds "should be available during the early part of this year." Total expenditures from the rapid transit fund so far amount to \$3,492,666, with approximately \$300,000 additional certified for expenditures, leaving \$159,686 on hand.

RESULTS OF OPERATION OF ELECTRIC BAILWAYS OF NEW YORK STATE OUTSIDE OF NEW YORK CITY

1919	1920	1921
840,227,395	142,059,281	542,824,208
32,797,351	39,483,189	37,290,565
37,430,051	\$7,576,098	\$3,533,646
2,473,104	2,668,731	2,779,829
\$4,956,947	\$4,907,362	\$2,753,813
636,846	824,809	817,335
542,316	968,331	1,086,074
16,156,105	\$6,700,707	\$4,657,220
8,530,119	8,943,678	8,548,373
604,497	636,614	642,060
1/200 \$2,998,520	Lama \$2,879,590	Lune 34,533,411
315,719	303,719	419,659
713,102,461	743,233,247	643,870,858
97,918,246	97,356,831	91,059,219
2,011	2,014	7,001
81 53%	83 90	87,08%
	\$40,227,395 \$2,797,351 \$7,430,051 2,473,104 \$4,956,947 656,846 542,316 \$6,156,105 8,550,119 604,497 1/### \$2,998,520 313,719 713,102,461 97,918,246 2,011	\$40,227,395 \$2,797,351 \$7,430,051 \$7,473,104 \$2,473,104 \$4,956,947 636,846 542,316 \$6,156,105 \$6,200,707 \$50,119 \$6,456,467 \$6,4497 \$6,456,467 \$15,00,109 \$15,00,119 \$15,0

Traffic and Transportation

Settlement Near

Negotiations Between the City Directors and Railway Officials Lead to Bus-Railway Arrangement

It is considered from recent developments that Pasadena, Calif., is about to have its transportation problems settled as a result of conferences between the City Directors and the officials of the Pacific Electric Railway. The directors and the officials of the railway have practically agreed on a plan. However, the directors are making moves to have the present 6-cent fare charged by the railway on its local lines in Pasadena lowered to 5 cents. Before this can be accomplished it will be necessary for the city of Pasadena and the railway to appeal to the State Railroad Commission.

RAILWAY OPERATES BUS LINES

On Jan. 12, 1923, the board of directors gave out a statement on the transportation question, making public the revised plan of the Pacific Electric Railway as submitted to the city by D. W. Pontius, vice-president and general manager, which was received shortly after the recent municipal bus bonds were defeated. If the directors of the city accept the company's plan, only four of the company's present local street car lines in Pasadena will be operated, namely, Lincoln Avenue Line, North Fair Oaks Avenue Line, East Colorado Street Line and Lake Avenue Line. The railway company agrees to operate bus lines on eleven streets and to place in service at once forty-five high-class motor buses and to give greater frequency of service than it has been doing with the abandoned street car lines.

The City Directors state that they will not grant franchises for bus lines, but will issue permits, and hold that when a bus supersedes an electric street car line the service should be more frequent. The directors also maintain that there should be a revised valuation of the company's holdings in the city of Pasadena, a check should be maintained on the company's accounts and that the city shall have the right to buy the bus system at cost less depreciation.

ADVANTAGES OF SINGLE AGENCY STATED

The board further states that it is a recognized fact that the public convenience is best served by having a single agency conduct an entire transportation system, greater economy of operation and consequently less cost of service results with the elimination of conflicting interests, and at the same time greater convenience is offered to the patrons than can be had from separate systems, without the universal transfer privilege; but all of this, provided this agency can be controlled and

regulated, will be responsive to public necessity in the matter of facilities, service and future improvements.

Practical agreement exists on the various points, but the board of directors has taken the position that a modification of the present fare is essential for frequent users of the service in the form of reduced rates for tickets. It will be necessary to secure the approval of the State Railroad Commission before any adjustment of fare can be made, and this approval it is proposed to obtain by joint action by the railway and the city.

The Pasadena traction question has been pending more than a year. The city rejected one after another several propositions made by the railway and an order of independent bus owners, and finally submitted to the voters a plan which asked a bond issue of \$500,000 for a municipally owned bus system. This was voted down by the people on Dec. 5, 1922. The trolley lines to be abandoned are all east and west lines in the city except those on Colorado Street, the Orange Grove Avenue line and the North and South Los Robles Avenue lines.

Rock Island Card Sales Exceed 11,000 Mark

The sale of identification cards in December on the Tri-City Railway of Illinois, Rock Island, reached the highest mark since the fare system was begun ten months ago. The actual figure for last month was 11,639 cards, which were sold for 50 cents and entitled the holder to a 5-cent fare. During the month there were 570,000 5-cent fares or an average daily riding of 1.8 per card. Records, since the card system has been in force, show that this average has remained about the same each month.

The plan for selling the cards in stores located in convenient parts of the city has worked out well. In all, some fifty places about the city handle the cards and as high as 800 have been

March.		1	9	12	22	?						,					8,515
April .																	9,395
May .																	9.327
June .																	9.379 9.033
July . August																	9.027
Septem																	
October																	
Novem	b	eı	r	Ī	i		i	i	i	i							10,583
Decemb																	11.639

sold from one store. It has also been noted that there is some call for the cards within only a few days of their expiration. Salesmen, having learned of the card system, purchased them, it is thought, because the large amount of riding in the short stay shows a saving over the 10-cent fare.

The card sales in Rock Island since the plan became effective on March 1, 1922, are shown in the accompanying table.

Plans on Bus Service Halted

Toledo's decision to get into the bus business through the establishment of auxiliary service by the Community Traction Company has been upset several times in the last fortnight by the changes of attitude on the part of members of Council.

Objection was raised to the addition of the \$30,000 investment suggested by Street Railway Commissioner W. E. Cann to the capital value of the company. Then the Council repealed its original legislation providing for that and another resolution, asking that the buses be bought from the depreciation fund, was thrown into the hopper. The commissioner was also requested to get bids from private operators.

At a meeting of the finance committee of the Council on Jan. 17 he submitted bids ranging from \$13.50 to \$26 a day depending upon the value of the equipment, which ranged from \$600 to \$3,700 a bus. Some were bids for use of old cars, others for new machines and the range in passenger carrying capacity was from fourteen to sixteen.

Mr. Cann said he had estimated that the cost of similar service if rendered by the Community Traction Company, under the original plan with new equipment would be \$17.38 a day.

The committee voted six to two to accept Mr. Cann's proposal, but left no way open for the financing of the matter. That will be taken up by the Council at its next meeting.

Mr. Cann said that it was illegal to take money out of the street railway depreciation fund for the purchase of the Oak Street buses. However, he did report that the Erie Street line, which goes across the old Miami & Erie Canal, is costing the company 9.76 cents a passenger to operate and that now the line is in need of repairs.

He recommended purchase of a bus for this service and the taking of the money from the depreciation fund.

Independent bus operators had to renew licenses by Jan. 20 and the safety director had informed them that insurance and an indemnifying bond of \$1,000 each had to be filed by that date or they would not be permitted to operate. The busmen have asked waiver of the requirement because many complained they were unable to get surety in that amount.

Service Buttons to Employees

At the annual Christmas tree celebration of the Beaver Valley Traction Company, New Brighton, Pa., service buttons were formally presented to seventy-three employees. The buttons, which are inscribed with the words "Beaver Valley Traction Company" and the number of years of service, are of gold, triangularly shaped with a black center and a tiny street car on top. General Manager Boyce arranged for the presentation and E. E. Hamilton, vice-president, addressed the men. One honor employee has put in twenty-three years' service with the company. He is II. J. Meyer, master mechanic.

Railway Seeks Jitney Rights

The Eastern Massachusetts Railway petitioned the City Council of Malden, Mass., on Jan. 16 for a jitney license from Malden to Cliftondale via Linden and North Broadway, with the right to sell a book of twenty tickets for \$1, each good from Converse Square to the entrance of Forest Dale Cemetery on Main Street. This would give Main Street residents a 5-cent fare where they now are charged 10 cents.

The Eastern Massachusetts Company offers to run express over the territory where the Elevated feels that competition has been made by the Hart jitneys. The petition went to the special committee on motor vehicles, together with the petition of the Elevated for a jitney line from Malden to Linden, from Malden to Edgeworth and the petition of Joseph Hart for jitney licenses.

When the L petition for a jitney line from Malden Square to Edgeworth was read Alderman Trainor said he understood there was no Sunday or holiday schedule on it, and investigation proved this statement correct. Before acting on the petition the committee will investigate this phase of the question.

Connecticut Fares Reduced Ten per Cent

A voluntary 10 per cent fare reduction over lines of the Connecticut Company, which means most of the trolley routes in the State, effective April 1, was voted by the Board of Directors on Jan. 13. An announcement to this effect was recently made from the company's office in New Haven. This reduction is available through the use of tokens now selling at three for a quarter, and which on April 1 will be two for 15 cents.

The company's statement says that improved financial conditions, increased patronage, and continued relief from jitney competition make possible the reduction.

Santa Barbara Pass Gets Good Start

Reports from the Santa Barbara & Suhurban Railway, Santa Barbara, Calif., covering the first three weeks of its unlimited-ride weekly pass are considered most favorable. The period covered, namely, Dec. 11 to Dec. 31, 1922, inclusive, shows 7.5 per cent more revenue when compared with the same period of 1921 and about 7 per cent more revenue when contrasted with the twenty-one days just preceding the pass. The relative increases in usefulness to the public, as measured by rides taken, were 22 per cent and 20 per cent.

The pass costs \$1. The cash fare is 8 cents with five tickets for 35 cents. The effect of the pass has been to cut down the number of ticket purchasers, whereas the maximum fare riders have actually increased in number. These facts held good for both methods of comparison used. Another interesting fact is that the number of school

tickets sold shows a decrease, although these are obtainable at the rate of forty for \$1, or only 2½ cents each. This indicates that in some families the pass is used partly by one of the children under twelve between the hours of 8 a.m. and 6 p.m. on school days (these are the limitations on school tickets) and partly by other members of the family. As the average gross fare from a pass was 3.8 cents, it will be seen that some school children pay 1.3 cents more per ride on a pass than on a 2.5-cent ticket.

Appeal to Legislature for Trackless Trolley Buses

An effort will be made to have the Wisconsin Legislature grant the city of Milwaukee power to permit the Milwaukee Electric Railway & Light Company to operate trackless trolley cars on the streets of Milwaukee.

The company offered some months ago to install a trackless trolley line on Lincoln Avenue as an extension to the present railway system. City Attorney Niven of Milwaukee, in an opinion rendered at the request of the City Council, held that the city is under the present law without authority to grant such permission. Residents of the south side, where it was proposed to have the trackless trolley line operate, have been very much in favor of the project and have exerted pressure on the Common Council with the result that the Legislature will now be asked to pass necessary amendment to the law which will permit the city to authorize trackless trolley operation in Milwaukee.

Council Approves Bus Franchise

While final decision was not made in the Circuit Court on the electric railway bus franchise litigation of Nov. 7 and while petitions are in circulation for the resubmission of the last franchise slightly modified, the City Couneil of Saginaw, Mich., has approved a ten-year franchise for the Saginaw Motor Omnibus Company, a \$500,000 corporation. The Council has ordered the submission of this grant to the electors at the primaries on March 7. Those interested in the corporation are John Wade, Atlantic City; Samuel Bogert, Walter Kutzlieb and George R. Bidwell, New York City. Imperial omnibuses are to be used if the franchise carries, and active management is expected under Mr. Wade, who operates omnibuses in Minneapolis, St. Paul, Cleveland, Akron, Miami and Atlantic City. The citizens' committee which is back of the proposal for a street ear-hus franchise will continue its efforts to obtain approval of its plan.

Trolley Buses for Philadelphia.—The Philadelphia Rapld Transit Company has decided to purchase fifteen trolley buses for use on Oregon Avenue in Philadelphia.

Metal Tickets in Force. The United Electric Railways, Providence, R. 1., put into effect on Jan. 1 its 6-cent fare schedule with ten metal tickets for 50 cents. President Potter said that the end of the second week of circulation of the fare disks found them constantly gaining in favor among the patrons.

Planning One-Man Cars.—The Morris County Traction Company, Morristown, N. J., is planning the operation of one-man cars only. They now run from Summit to Elizabeth, Wharton to Rockaway and Denville to Boonton. Employees have filed a protest against the installation of this system with the Dover Board of Aldermen.

Hearing on Rates Announced.—The Kansas Public Utilities Commission at Topeka, Kan., has announced that it will hold a hearing Feb. 24 on the application of the United Traction Company to put in effect interurban rates between Manhattan and Junction City and stage rates between Junction City and Abilene.

Second Bus Line Started.—The Johnstown (Pa.) Traction company through the subsidiary company, the Traction Bus Company, on Jan. 21 placed the second trolley feeder bus line in operation in Cambria County. A 5-cent fare is charged. A few weeks ago the traction company opened the first bus line.

Proposed Five-Cent Fare.—Bills have been presented in the House of Representatives proposing a 5-cent fare on all electric railway lines in the City of Providence and prohibiting the use of one-man cars operating over grade crossings. The act would establish a one-fare zone in Providence so that a person could ride from the farthermost point in the city to the other for 5 cents.

North Shore Opens Another Feeder Line,—The Chicago, North Shore & Milwaukee Railroad has established a feeder bus line from Waukegan, Ill., to Kenosha, Wis. This railway started a bus service on Aug. 12 between Lake Geneva and Kenosha and the establishment of other feeder lines is under consideration. The one-way fare from Waukegan to Kenosha is 45 cents for the 16-mile trip, which is made in fifty six minutes.

Bus Service to Start.—The Springfield (Mass.) Street Railway expects to start its new bus service over the Hampden County Memorial Bridge to West Springfield points within a few days. By the terms of the permit granted the company Jan. 16 by the Public Utilities Commission the company has authority to run motor buses anywhere in its territory.

Lower Fare Rate Disclosed.—Operation of the Cleveland (Ohio) Railway during 1922 produced results which indicate that a slight reduction in the rate of fare will probably go into effect March 1. This information was disclosed as a result of the meeting of the directors on Jan. 25. The present rate of fare is 5 cents cash, with 1 cent for transfer, and the new rate will make no change in this, but tickets will be sold at eleven for 50 cents. The company estimates the reduction will approximate 10 per cent.

Personal Items

Mr. Deal Leaves Springfield

E. C. Deal has resigned as manager of the Springfield (Mo.) Traction Company and the Springfield Gas & Electric Company, owned by the Federal Light & Traction Company, New York, to become associated with the Electric Bond & Share Company, New York. Mr. Deal will assume his duties as adviser of the public utilities of that company as soon as a manager is appointed to succeed him with the Springfield companies.

During the four years that Mr. Deal has been general manager of the Springfield properties many improvements have been made in the railway, electric and gas service. Among them is a \$1,000,000 power plant now nearing completion. He installed buses in city operation and succeeded in keeping fares to 7 cents cash with four tickets for a quarter. Mr. Deal also put into effect a very successful plan of customer ownership.

Before becoming connected with the properties at Springfield Mr. Deal was general manager of the Federal Light & Traction Company's properties at Trinidad, Col. Prior to that time he was associated with Stone & Webster, Boston, Mass.

W. O. Wood Resigns from New York & Queens County Railway

William O. Wood has resigned as president and general manager of the New York & Queens County Railway, Long Island City, now in the hands of Gen. Lincoln C. Andrews as receiver. He has been connected with the company since 1908, first as vice-president and general manager.

Mr. Wood has been connected with the railway properties in Greater New York since 1903. In that year he entered the employ of the Brooklyn Rapid Transit Company, then under the direction of Col. E. W. Winter. Charged with the responsibility of rehabilitating the Brooklyn lines after the serious impairment of their physical structure and earning capacity, Colonel Winter scoured the country for talent with which to rehabilitate the lines and Mr. Wood was one of the galaxy of transportation stars that Colonel Winter gathered around him at that time in rebuilding the personnel of the company. Others among them were W. S. Menden, W. G. Gove and the late John F. Calderwood.

Mr. Wood began his electric railway career in Detroit in 1900 as general superintendent of the Rapid Railway. From there he went to Brooklyn. His first position there was superintendent of the elevated lines. The following year he was made assistant general superintendent of the company. In 1907 he resigned to become associated with the Interborough Rapid Transit Com-

pany and for a year was engaged in special work, reporting to President Shonts. From that company he went to the New York & Queens County Road, affiliated with the Interborough group. Previous to his service in Detroit Mr. Wood was for ten years associated with the Illinois Central Railroad as train-

master and as secretary to J. T. Harahan.

In June, 1921, Mr. Wood was elected president of the New York Electric Railway Association. He is one of the best-known railway men in the country and has won many friends within and without the industry through a most attractive personality. He has always been interested in association work, and he has been unfailing in his attendance at the sessions of the New York body. He has not announced his plans for the future.

J. P. Barnes C. E. R. A. President

Louisville Executive Honored, Although in Central West Only a Little More than Two Years—Remarkable Record Made by Him in Managing Road in Southern City

JIM BARNES, president Louisville Railway, was elected last week to succeed Sam Greenland as head of the C.E.R.A. Although Jim considers himself a newcomer in his territory, he has established himself completely in the



J. P. Barnes

association by his work for its welfare and his enviable record as a railway executive in Louisville. Those present at the annual meeting received irrefutable evidence that Jim Barnes is a master in the art of public and employee relations. Mayor Quin of Louisville and Arthur Krock, managing editor of the Courier-Journal-Louisville Times, both addressed the C. E. R. A. meeting at Louisville and stressed the fact that Mr. Barnes had gained the confidence of every one in Louisville and had established himself as one of the city's indispensable citizens.

Jim Barnes is everything to Louisville because first Louisville was everything to Jim Barnes. It was in July, 1920, that Mr. Barnes left the Schenectady Railway to become head of the Louisville property. He had been there only a few days when this incident happened. Two men stood slightly removed contemplating Mr. Barnes. Said one: "Nice, fellow, Barnes; seems too bad, doesn't it?" "Yes," said the other, "it

not only seems too bad, but it is too bad." They were referring to the situation which Mr. Barnes had inherited. Moreover, Mr. Minary, the former president, was on record as having said publicly, "My heart goes out to any man who must take the responsibility of the management of a street car company." Mr. Minary meant it.

Some time before that Mr. Minary. who had directed the company for thirty years, retired to become chairman of the board. The property was then placed in the hands of a committee of three of the directors, W. S. Speed, W. H. Kaye and John W. Barr, Jr. An increase in fares had been denied the company. The situation on the whole was a mighty complex one. Dividends on the preferred stock had been suspended in 1918, and shortly before that the payment on the common stock had been cut off. It was just about this time that Mr. Barnes was offered the Louisville post. Other men would have been inclined to hesitate, but not Barnes. He fixed his management forces first, and then he took his case up with the city. Meanwhile the question of confiscation came before the courts and the company secured an order to charge a temporary 7-cent fare. All the time negotiations were in progress looking toward a permanent settlement, and this was effected last fall with an agreement providing for operation under serviceat-cost at an initial 7-cent cash fare, with five tickets for 30 cents, this rate to continue to Dec. 31, 1923. That briefly is the record of Jim Barnes with the Louisville Railway. It is only part of the story, however.

Mr. Barnes from the beginning made himself a factor in the business life of the city. He is a member of all the prominent clubs, a bank director and a director of the Louisville Industrial Foundation, the so-called \$1,000,000 factory-getting enterprise of Louisville, founded to aid in bringing industries to the city. He has endeared himself to the boys of the city by taking a prominent part in the Boy Scout movement. No matter what the local activity, the reply to the inquisitor is always the same: "Have you asked Jim?"

It is indeed unfortunate that the sum-

mer cruise of the Central Electric Railway Association is to be omitted under Jim Barnes' leadership, for he has proved himself such an able commander of river cruises for his employees. Among the numerous employee outings conducted by the Louisville Railway the river trip is the feature, and on these occasions Jim Barnes can be seen standing beside the gangplank welcoming each one that goes aboard and then circulating around during the trip to see that every one is happy.

Mr. Barnes is a native of Syracuse.

N. Y. He was graduated from the Massachusetts Institute of Technology. His railway work previous to going to Louisville included terms of service with the Oneida (N. Y.) Railway, Syracuse Rapid Transit Company, Syracuse & Suburban Railway, Buffalo, Lockport & Rochester Railway and the Schenectady Railway. In 1916 he was president of the New York Electric Railway Association. His activities in behalf of the American Electric Railway Association are so well known that the need does not exist for repeating them here.

General Andrews was appointed to the United States Military Academy from Seneca Falls, N. Y., in 1889, and was graduated in 1893. He was aide to General Sumner, commanding the cavalry division, in the Santiago campaign during the war with Spain, and was a Major of volunteer infantry in the Philippines and first American Governor of the Island of Leyte. Later he was instructor at the Military Academy and was active in officers' training work before the World War, in which he commanded a brigade in this country and in France. Later, as Deputy Provost Marshal General in France, he assisted in the organization and training of the American Military Police. General Andrews retired from active service in the army in 1919, and before becoming executive officer of the Transit Commission was in charge of the military training of boys under the New York State Military Training Commission.

General Andrews Receiver of Queens Line

Chief Executive Officer of New York Transit Commission Will Direct Road for Court—E. A. Roberts, Utility Expert, Named as General Manager to Serve Under Him

GEN. LINCOLN C. ANDREWS was appointed receiver of the New York & Queens County Railway, Long Island City, N. Y., on Jan. 18. For two years previous he was chief executive officer of the New York Transit Commission and withdrew from the com-

worry, but it is wonderful to take a sick property, work over it and see it respond. There will be many times when you will damn the job and all that goes with it, but next morning you will be back with the bit in your teeth ready for another long, hard day.

"If there is anything that my little organization or I can do for you, do not hesitate to let me know."

General Andrews regards this as a delightful expression of the mental attitude and point of view of the successful railroad man of to-day. It confirms the impression gained by the General when in 1921 he was a member of a party of railway men and commission officials that made a tour of inspection of the city railway properties in Philadelphia, Cleveland, Kansas City, Chicago and other places to study operating methods in those cities. At that time he said that the thing that impressed him most forcibly was that the type of men who are either managers or operators of the properties which he visited were keen, wide awake and intensely devoted to giving the public the best possible service.



L. C. Andrews

mission to accept the appointment to the railway. General Andrews entered upon his duties with the railway at once. The receivership was precipitated by announcement by the Interborough Rapid Transit Company to the effect that it would cease to make up the deficit on the Queens County line, which operates in Queens County and into the Borough of Manhattan over the Queensborough Bridge.

General Andrews appreciates keenly all the expressions of good will toward him made on the announcement of his appointment, especially the attitude of Chairman McAneny of the commission in releasing him; but he was particularly pleased with a letter that reached him the day after he entered upon his new duties. This letter, from a railroad man in charge of one of the New York City properties, follows:

"Dear General Andrews: I see by the morning papers that you are 'out of the frying pan and into the fire.' I want to tender my congratulations and bid you welcome to the ranks of the slaves.

"You will find lots of cause for

AN ARMY MAN IN BUSINESS

General Andrews left the regular army after the war for the purpose of trying his hand in business. His first real experience was the year and a half he has just finished as chief executive officer of the New York Transit Commission. While he started with no predilections for any special line of work, his contracts with the electric railway business during this period aroused in him a desire to continue in the railroad game, for it appealed to him as vital and very much a man's proposition, particularly in these parlous times. That is the main reason why he accepted the appointment as receiver of the New York & Queens County Railway. He regards the position as offering him an entrance into what he now considers his chosen field. lie is thoroughly alive to the fact that the situation before him is a very trying one, but has been nerved to the task by the feeling of assurance that he has the sympathetic good will of his associates.

E. A. ROBERTS GENERAL MANAGER

As general manager to the receiver, General Andrews has chosen E. A.



E. A. Roberts

Roberts, who since last April has been chief of the transit bureau of the New York Commission. Mr. Roberts has a long list of accomplishments to his credit. He went with the commission from the force of John A. Beeler, for whom he acted as principal assistant. Mr. Roberts became associated with Mr. Beeler in 1917 and served with him for the Massachusetts Public Service Commission in the investigation of operating methods and practices preceding state control of the Boston Elevated Railway, and with the Public Utilities Commission of the District of Columbia. His work in Washington had to do with recommendations looking toward the increase of the capacity of the Washington railway systems under war conditions. He has also made extensive investigations for the Philadelphia Rapid Transit Company and the Public Service Railway of New Jersey. With the New York Transit Commission Mr. Roberts' work had to do primarily with the making of plans for the efficient utilization of the transportation facilities already in existence.

The significance of this work can best be judged by the fact that under conditions as they exist in New York at present it will be five years at least before more new subways can be completed and placed in operation and

perhaps many years more.

After he was graduated from Harvard College in 1914 Mr. Roberts spent two years with the General Electric Company at Lynn, Mass., and Erie, Pa., in departments connected with the manufacture of electric railway apparatus. During 1916-19 he was a research member of the faculty of the railway engineering department of the University of Illinois, and for a short time thereafter he was associated with the Boston Elevated in its electrical engineering department.

Mr. Kanneberg Named to Wisconsin Railroad Commission

Adolph Kanneberg, lawyer and Court Commissioner, has been appointed by Gov. J. J. Blaine of Wisconsin a member of the Wisconsin Railroad Commission, succeeding Carl D. Jackson, who recently resigned to become counsel for the National Electric Light Association.

Mr. Kanneberg has been an active supporter since 1900 of the LaFollette wing of the Republican party in Wisconsin. In 1920 he was a candidate for Attorney General on the LaFollette ticket, but was defeated at the primaries. In 1922 he was chairman of the Progressive Republican Club of Milwaukee County. He has held no public office other than that of Court Commissioner. Mr. Kanneberg is a resident of Milwaukee and his appointment follows the wishes of the Milwaukee City Administration to have a Milwaukee man on the commission.

It is reported that Governor Blaine will appoint Frank McManamy, a traffic expert of Washington, D. C., to succeed Henry Trumbower, whose term expires in February. Mr. McManamy has been active in the railroad brotherhoods.

The term for which Mr. Kanneberg was appointed has two more years to run while that to which it is expected Mr. McManamy will be appointed is a six-year term.

Obituary

H. G. McConnaughty

H. G. McConnaughty, who has recently been associated with the Edison Electric Illuminating Company of Boston, died on Sunday, Jan. 21, after a long illness. During the war Mr. McConnaughty acted as an assistant on the fuel board, which was one of the committees of the Council of National Defense at Washington. He was at one time exhibit director of the American Electric Railway Association and subsequently of the National Electric Light Association. Some years ago he was identified with the Dearborn Drug & Chemical Corporation.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

500 Electrically Operated Turnstiles Ordered

An order for 500 electrically operated turnstiles to be used by the Interborough Rapid Transit Company, New York, on its elevated system has been received by the General Electric Com-

pany.

This will be the first use of electric turnstiles on the elevated lines in New York. The feature of the electric turnstile is that the nickel when dropped into the slot lands between two contacts, thus completing an electrical circuit which releases the turnstile, allowing it to turn just far enough for one person to pass, and at the same time locking it from use in the opposite direction.

After the passenger has passed the nickel falls from the contacts to a space behind a magnifying lens, where it is plainly visible until another nickel is deposited. An electric lamp in the fare box illuminates this enlarged figure of the coin, thus providing a means for detecting false coins. The turnstiles are similar to those now in use in the New York subway.

Changes Announced in Western Electric Organization

The Western Electric Company has announced important organization changes.

F. A. Ketcham has been appointed general manager of the supply department. For the past four years he has

been general sales manager.

G. E. Cullinan assumes the position of general sales manager. Mr. Cullinan entered the employ of the company upon his graduation from Williams College in 1901 and for several years was connected with the New York house. He went to St. Louis in 1907 and was manager there from 1909 to 1918 going to Chicago as central district manager.

L. M. Dunn, who for the past three years has been manager of the Eastern District, which includes the New York and the New England territory, has been made general merchandise manager on the general manager's staff.

W. J. Drury has been made manager of the Eastern District to fill the vacancy created by Mr. Dunn. Mr. Drury has been sales manager of the New York house for the past three years, and is succeeded in that capacity by J. F. Davis, who has been sales manager of the Boston branch for the same period.

T. E. Burger has been made sales manager at Boston. Mr. Burger was for thirteen years connected with the Los Angeles and San Francisco organizations, being sales manager of the

former. More recently he has been on the staff of the Society for Electrical Development, coming back to the Western Electric organization in 1922.

W. P. Hoagland has been appointed central district manager in charge of the Chicago and Minneapolis branch houses. For the past three years Mr. Hoagland has been sales manager at Chicago.

J. H. Gleason takes the position of Chicago sales manager. Mr. Gleason has been power apparatus sales man-

ager at Chicago.

H. L. Grant, who for the past three years has been general appliance sales manager, located at New York, has been appointed Erie district manager, a new grouping of the distributing houses at Cleveland, Pittsburgh, Detroit and Cincinnati. Mr. Grant's headquarters will be at Cleveland. A. M. Collins continues as manager at Cleveland.

It is interesting to note that all of these organization changes are in the nature of promotions. They became

effective on Jan. 15.

Mr. Down Vice-President Westinghouse Traction Brake Company

The Westinghouse Traction Brake Company of Wilmerding, Pa., has announced the election of S. G. Down as vice-president in general charge of sales and commercial activities. Mr. Down has been general sales manager of the company, with headquarters at Wilmerding. Previous to the appointment as general sales manager, he had been president of the Westinghouse Pacific Coast Brake Company, at Emeryville, Calif., and Western district manager of the Westinghouse Air Brake Company and Westinghouse Traction Brake Company.

Mr. Down came to the Traction Brake Company from the Michigan Central Railroad in 1902 to act as instructor on the Westinghouse Air Brake instruc-

tion car.

Metals-New York

Metal, Coal and Material Prices

Jan. 23, 1923

Copper, electrolytic, cents per lb	14,50 16,75 8,00 7,00 40,00	
Smokeless mine ruo, f.o.b. vessel, Hampton Roads, gross tona	\$8.75 5 00 3.50 2.675 1.70 2.50	
Rubher-covered wire, N. Y., No. 14, per 1,000 ft	6,85 16.50 \$2.05 93.00 12.625 \$1.53	

Walter Jackson Consultant to Detroit City Line

The Department of Street Railways, city of Detroit, through the Board of Street Railway Commissioners and Ross Schram, assistant general manager, has engaged Walter Jackson to make an analysis of the workings of each department along the following lines:

1. Compare the practices of the Detroit United Railway and those of

the successor organization.

2. Suggest any changes or additions that will help to make the Detroit system the best mass transport organization in America.

His report will be made public so that the people of Detroit as well as the industry at large will be able to judge intelligently as to what the Department of Street Railways found upon taking over the Detroit United Railway, what it has achieved so far in rebuilding the lines and in managing them and what it hopes to accomplish in the future.

Mr. Ong Consultant at Los Angeles

J. R. Ong, consulting transportation engineer, has been engaged by the Los Angeles (Calif.) Railway, to make a survey of Los Angeles traffic conditions. Mr. Ong is now actively at work on extensive travel checks and other features of his work.

Los Angeles is at present wrestling with the problem of traffic congestion in the downtown business district which handicaps street car operation.

Mr. Ong's immediate objective will be to assist the management of the Los Angeles Railway in giving the public the best possible service under existing conditions, and he will also show what steps are necessary for the company to play its proper part in the future development of Los Angeles.

Rolling Stock

Indiana Service Corporation, Fort Wayne, Ind., is considering the purchase of some new light-weight interurban cars.

Northern Ohio Traction & Light Company, Akron, Ohio, recently purchased new milk cars of 80,000 lb. capacity from the American Car & Foundry Company.

Seattle, Wash.-An ordinance has been introduced which provides for the lease with option of purchase of from 100 to 200 new fifty-eight passenger cars. Purchase will be made from the earnings of the Municipal Railway system. The plan is outlined elsewhere in this

Springfield (Mass.) Street Railway and Worcester Consolidated Street Railway have purchased two escalator snow removers costing about \$3,000 each. This device built on a caterpillar tractor is expected to lighten the financial burden of snow removal. They were built at Aurora, Ill.

Reading Transit & Light Company, Reading, Pa., will soon put into service three model cars constructed in its own shop. Practicable suggestions from patrons were incorporated into the new type of car. The cars, which were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 21, are about 45 ft. in length, seat forty-six passengers and have large safety guarded windows.

Interstate Public Service Company, Indianapolis, Ind., recently ordered from the American Car & Foundry Company, Jeffersonville, Ind., twenty-five box cars, fifteen stock cars, and four ballast cars. One new 50-ton electric locomotive was also ordered from the Westinghouse Electric & Manufacturing Company. The stock cars will be of 60,000 lb. capacity and the box and ballast cars of 80,000 lb. capacity. All of these cars except the stock cars will be built with steel underframes.

Philadelphia (Pa.) Rapid Transit Company has ordered 576 new cars, costing approximately \$6,500,000. Of the car order, 520 cars will be of the regular passenger type, thirty-four snow plows and sweepers, twenty construction and supply cars, one crane car for subway (elevated operation) and one crane car for surface operation. The J. G. Brill Company will build the new cars and will commence delivery at the rate of three a day on June 1 next. The expenditure will be financed by cash payments of \$1,750,000 by the company, while the remainder will be taken care of by an issue of car trust certificates, mentioned elsewhere in this

Track and Roadway

Puget Sound Power & Light Company, Bellingham, Wash., announces that it will rebuild its South Elk Street tracks and repave between them this year, at a cost of approximately \$60,000.

Pacific Northwest Traction Company. Scattle, Wash, will expend approximately \$150,000 in rebuilding the waterfront trestle, 41 miles long, used by the interurban between Bellingham and Three million feet of tim-Blanchard. her and 20,000 ties will be needed for the improvement. The material will be purchased locally.

Trenton & Mercer County Traction Corporation, Trenton, N. J., will lay a double-track line on Hamilton Avenue from Chambers Street to Olden Avenue and on Olden Avenue from Hamilton Avenue to East State Street. The company will also place a new switch on Perry Street and remove the one on North Brond Street.

Youngstown (Ohio) Municipal Railway announces through Superintendent Stewart that it will rebuild its line in Albert Street in the spring. The work will cost about \$46,000, of which about half will be charged to maintenance expense and half to the company's capital value under provisions of the franchise

Trade Notes

Bemis Car Truck Company, Springfield, Mass., is constructing a one-story, 55 x 140-ft., brick addition to its plant on Pirnie Avenue, which will cost about \$40,000.

The National Forge Company, an Alabama company, recently transferred to a Kentucky charter and is erecting a plant in Louisville for the production of railway supplies, including knuckle pins, coupler yokes, rivets, brakeshoe keys, center pins, draft keys and other parts. Equipment of the Alabama plant and additional equipment will be installed as soon as the local building is completed.

Collins Switch & Signal Company, formerly the American Automatic Switch Company, has terminated its. contract with the United States Electric Signal Company under which the latter company has manufactured and sold the devices of the former company for the past nine years. In the future this company will manufacture its electric track switches, tower controls and eurb controls at 59-65 McWhorter Street, Newark, N. J.

S. E. Marks has been appointed director of traffic and shipping for the-Westinghouse Electric & Manufacturing Company. Mr. Marks entered the employ of the Westinghouse Company in 1892, accepting a minor clerkship at the first Westinghouse plant in Garrison Alley. Shortly after the works was moved to East Pittsburgh he was transferred to the storekeeping and shipping departments, which at that time were combined. In 1903 he was appointed assistant shipper and in 1906 was made head of the shipping department when a new department was created. This appointment carried with it the responsibility of both packing and shipping for the domestic and foreign business of the company.

New Advertising Literature

Itailway Improvement Company, New York, N. Y., has issued an illustrated booklet on the Ransom vacuum oiler. It shows the oiler installed on motors on a large number of properties.

Sterling Varnish Company, Pitts-burgh, Pa., has appointed H. L. Hazeltine, formerly its Eastern manager, to the position of engineer of insulation. After Feb. 1 Mr. Hazeltine's headquarters will be at Pittsburgh.

American Wood Preservers' Association, Chicago, Ill., has published its first issue of Wood Preserving News. The object of this periodical is to provide a carrier of information to the engineering profession concerning the use of treated wood. The first issue outlines the program of the nineteenth annual convention of the American Wood Preservers' Association, which was held in New Orleans from Jan. 23: to Jan. 25.



PEACOCK STAFFLESS BRAKES

Light but powerful

That's why they are so peculiarly adapted to the standard safety car. It's the reason why so many roads specify Peacock Staffless Brakes in spite of all inducements to accept some other kind.

Here is a hand brake which, without any extra weight to carry around, has been designed to develop the maximum braking power which the wheels will take without skidding and a brake which will accomplish this with least effort and time expended by the operator.

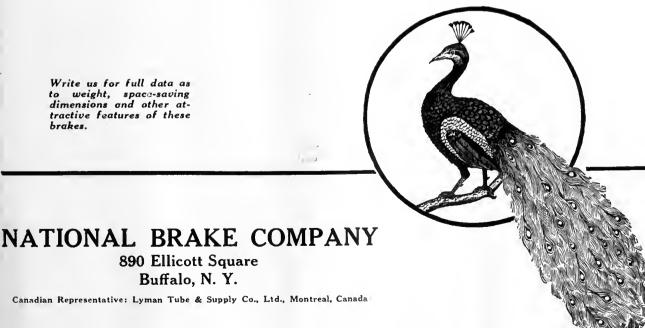
These features are the ones which pay, when a quick stop succeeds in saving a car full of people, from some impending accident.

Write us for full data as to weight, space-saving dimensions and other attractive features of these brakes.



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You won't find it in the specification, but—the one vital part that means the success or failure of your investment is—"Passenger Popularity."

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The HIFLEX spring suspension, an exclusive Mitten-Traylor feature, guarantees a smooth

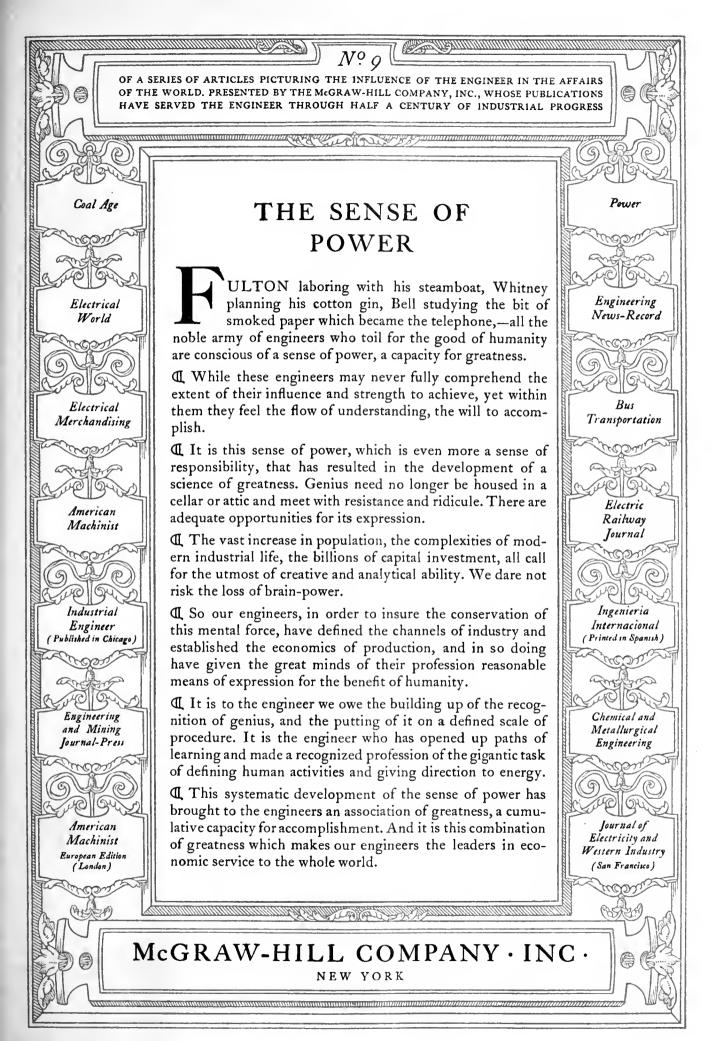
ride over any road, and passengers demand a comfortable, non-vibrating ride first of all.

In addition, Mitten-Traylor Buses are: Well-lighted, well heated, well ventilated, powerful, with a specially designed, 6-cylinder bus engine, roomy, comfortable and clean—and SAFE to ride in under all conditions.

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The London Service of the United States Lines is a combination passenger and express freight service. It is maintained on a fast express schedule every Wednesday and places American shipments at their port of destination with a saving of time that brings the ports of loading and unloading nearer.

This London Service is a valuable servant of American Industry; a keen-edged tool for American Engineers. Each Wednesday, a swift, oil-burning American vessel is throbbing at the pier, awaiting the signal which will speed her on the way.

You are sure when you use this London Service. Your shipments are safe and carefully handled. They are unloaded on time. The new loading machinery on these vessels is a triumph of modern engineering. Recently 3500 bales of raw silk were unloaded from a ship of this type, reloaded on cars, and in 3 hours and 10 minutes the ship had resumed its trip.

For passengers, only one class of accommodations is available—with American Standards of comfort, cleanliness and luxury. Fares are as low as \$120.

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They indicate and record each transaction between passenger and conductor

Present day business methods demand that the amount of each retail sale be indicated to the purchaser and a permanent record made of it.

Ohmer Fare Registers apply this correct business principle to the sale of transportation on electric railway cars.

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The No. 62 Detail Fare Printer. This Register Indicates and Records Fares from One Cent in Value up to \$9.99 and Prints a Detailed Record of each Sale.



High Resistance Flexibility Non Hygroscopic Heat Resisting Chemically Neutral Maximum Elasticity

> TRVINGTON seamless bias tape varnished cambric is made in widths of 1½ in. and wider. Length 36 and 72 yd. rolls. Thickness .005 to .015 in. The advantages of a SEAMLESS over a sewed bias tape are: It can be continuously wound without the necessity of stopping to cut out a seam. Absence of seam avoids air pockets and the consequent lowering of dielectric at that apot. Can be wound with a taping machine. Will successfully supplant apot. Can be wound with a taping machine. Will successfully supplant method of insulating with linen tape and the subsequent impregnation with insulating varnish. Seamless bias can be wound with lap instead of butt joint.

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Established 1905

LARGEST MANUFACTURERS OF VARNISHED CAMBRIC IN THE WORLD

Why do they all single out Tool Steel Gears and Pinions?

In the American Association magazine, AERA, December, 1919 and January, 1920, someone put the following question:

E-e-347 Will you please give your opinion of a good, fair mileage for treated, untreated, hardened, and tool steel gears and pinions?

The following answers were received and printed:

- E. C. FOSTER, President, Manchester Street Railway Co., Manchester, N. H.—Non-treated gears city traffic, 50,000 miles; interurban, 75,000 miles. Making tests on hard steel gears.
- R. L. JONES, Master Mechanic, Massachusetts Northeastern Street Railway Co., Haverhill, Mass.—I have no absolute correct data on treated and untreated gears. We have some tool gears and pinions that have run 275,000 miles and have shown hardly any wear.
- F. H. HARRIS, Superintendent of Equipment, Charleston Consolidated Railway and Lighting Co., Charleston, S. C.—At present we are using nothing but tool steel gears and pinions, except on some new equipments, but as we have as yet not worn any out, we cannot give any definite information on this subject.
- H. W. DEININGER, General Superintendent, IOWA SOUTHERN UTILITIES COMPANY, CENTER-VILLE, IOWA.—We get approximately 250,000 miles from untreated pinions, or about four years' daily service on untreated gears. We have some on which we have kept a record, which have run 385,000 miles with very little signs of wear. Will probably reach 500,000 or 600,000 miles.
- C. H. NELSON, Superintendent, Grays Harbor Railway & Light Co., Aberoeen, Wash.—Indefinite; practically no trouble.
- RALPH A. GILL, Manager's Secretary, EL PASO ELECTRIC RAILWAY Co., EL PASO, TEX.—For treated tool steel gears, 300,000 miles. Pinions 180,000 miles.
- EDWARD A. WEST, General Superintendent, THE DENVER TRAMWAY CO., DENVER, COLO.

 —In Denver service untreated pinions average 40,000 miles; treated average 55,000 miles.

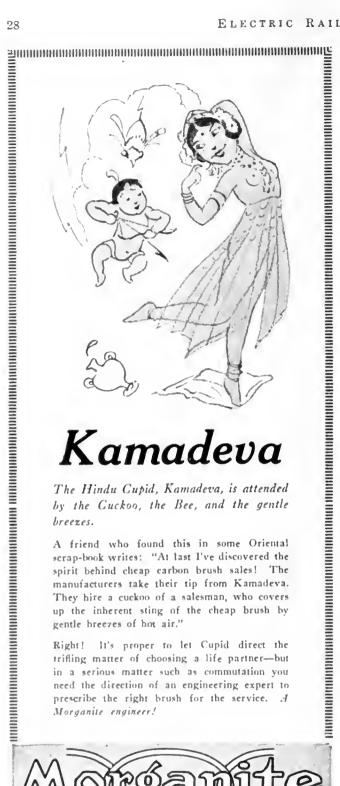
 Tool steel pinions running with tool steel gears average 300,000 miles. Tool steel gears for which we have mileage records show 755,661 miles.
- C. C. SLATER, General Superintendent, THE COLUMBUS RAILWAY, POWER & LIGHT CO., COLUMBUS, O.—It is impossible for us to give a fair answer to this question as operating conditions are the determining factors in gear life.

SUMMARY

Six definite answers, of which four companies regularly using Tool Steel gears. (and look at the dandy records they show) one company is testing, one company satisfied with untreated. No one seemed sufficiently enthused about those "just as good as Tool Steel—special quenched gears" to even record their tests.

The "live wires" of the industry who follow tests and use the question box for the experience of others are almost always "boosters" for Tool Steel gears.

There's a Reason!





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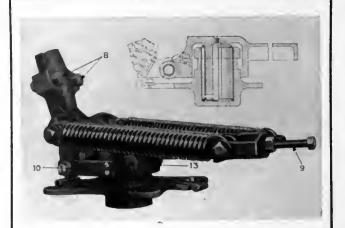
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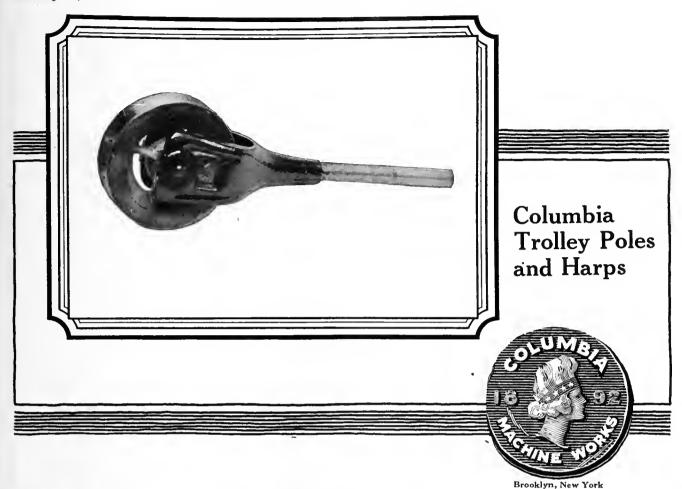
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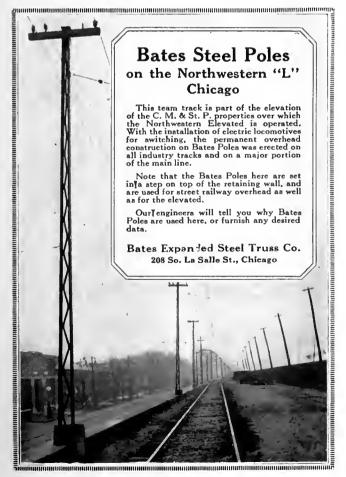
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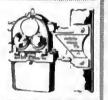
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Apply the advantages of the staffless brake with its space-saving features, to all your cars. Ackley No-Staff Brakes are adaptable to any kind of service. The eccentric chain-winding drum insures quickest applications and maximum power.

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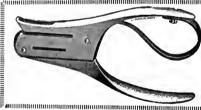
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Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Let us tell you why.

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USE LE CARBONE CARBON BRUSHES

They talk for themselves.

COST MORE PER BRUSH COST LESS PER CAR MILE

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More than seven thousand N-L Ventilators sold during 1922.

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Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

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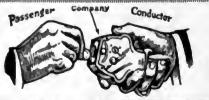
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MAN not over 30, Protestant, with experience in accounting to assist auditor of public utility having annual gross of one million, location New England, state experience, salary, when available, replies confidential. Address P-502, Electric Railway Journal, 10th Ave. at 36th St., New York City.

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AUDITOR or assistant. Twenty years' experience in electric railway, light and power. At present employed, but desire to make a change. PW-507, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

HIGH grade master mechanic, employed, desires change. 22½ years' experience. Live wire. Can produce results. PW-509, Ellec. Ry. Journal, Old Colony Bldg., Chicago, Ili.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campaigns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-499, Elec. Rallway Journal, Leader-News Bidg., Cleveland, Ohio.

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K-12-H Control, West. Air Taylor Trucks.
R.H. Type. Complete.
ELECTRIO EQUIPMENT CO.
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They Eliminate Journal Friction.

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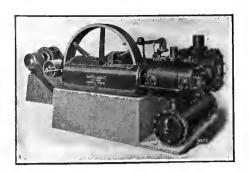
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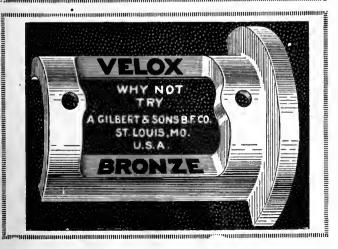
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ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	E Page	Page K	Page Railway Utility Co 38
Ackley Brake & Supply Corp., 32 Allis-Chalmers Mtg Co., 32 Allison & Co., J. E., 20 Amer. Brake Shoe & Fdry, Co., 37	Earli, Chas. I	Kelly, Cooke & Co	Ramapo Ajax Corp. 31 Riches, Albert S. 20 Robinson Co., Dwight P. 21 Rocbing's Sona Co., John A. 30
American Car Co	Electric Service Supplies Co 9	Le Carbone Co	Rome Wire Co
Co	P CO	M	S
American Steel & Wire Co. 31 Anaconda Copyer Mining Co. 30 Anderson Mfg. Co. A. & J. M. 30 Andrew Sangster & Co. 21 Arnold Co. 21 Arnold Co. 21	Feustel, Robt M. 20 Flood City Mfg. Co. 31 Ford, Bacon & Davis 20 Ford Chain Block Co. 34 "For Salo" Ads. 35	Marsh & McLennan 6 Mitten-Traylor 1ne 22 More-Joues Brass & Metal Co 34 Morganite Brush Co 28 Morton Mfg. Co 40	Samson Cordage Works 46 Sanderson & Porter 26 Searchlight Section 36 Sherman Service Co 16 Silver Lake Co 35 Smith & Co C E 26
	G	N	Smith Heater Co., Peter 39
It	Galena-Signal Oil Co	Nachod Signal Co., Inc	Stafford Roller Bearing Car Truck Corp'n
Babcock & Wileox Co 32 Barbour-Stockwell Co 31	Gilbert & Sons, B. F. Co 37 Gladium Co., Inc 33	National Brake Co	Standard Underground Cable Co. 30 Star Brass Works
Bates Expanded Steel Truss Co. 20	Gold Car Heating & Ltg. Co 39	National Fibre & Ins. Co 39	Stone & Webster 20
Beckwith-Chandler Co 31	Griffen Wheel Co 21	National Pneumatic Co., Inc 11 National Railway Appliance Co. 37	Stucki & Co., A 40
Beeler, John A	.,	New York Switch & Crossing Co. 31	. T
Bonney-Vehslage Tool Co 33	"Help Wanted" Ads 35	Nichols-Lintern Co 34	Texas Co
Brill Co., J. G	Hemphill & Weils 20	Nuttall Co., R. D 28	Tooi Steel Gear & Pinion Co 27
Byllesby & Co., H. M 20	Heyward-Wakefield Co 39	0	Transit Equipment Co 34
	Holst Englehardt, W	Ohio Brass Co	U
C		Ong, Joe R	U. S. Electric Signal Co 28
Cameron Electric Mfg. Co 30	1-11	_	U. S. Graphite Co
Carnegie Steel Co	Indianapolis Switch & Frog Co. 32 Ingersoll-Rand Co	Page & Hill Co	Universal Lubricating Co 3:
Collier, Ioc., Barron Co 14	International Creosoting & Con-	Page Steel & Wire Co	
Columbia M. W. & M. I. Co 29	struction Co	Pantasote CoFront Cover	W
Consolidated Car Fender Co 40 Consolidated Car Heating Co 40	International Steel Tie Co 7	Parsons, Klapp, Brinckerhoff & Douglas	"Want" Ads
Copper Products Forging Co 39	Irvington Varnish & Insulator	Perey Mfg. Co., Inc., 40	Wason Mfg. Co
Corp. Service Bureau, The 21	Co	Positions Wanted and Vacant 35	Westinghouse Traction Brake Co. 4
**	J	R	Wharton, Jr., & Co., Wm 31 White Engineering Corp., The
Day & Zimmerman Co., Inc 20	Jackson, Walter 20		J. G 20
	Jeandron, W. J	Rail Welding & Bonding Co 15 Railway Track-work Co 8	Wish Service, The P. Edw



STUCKI SIDE BEARINGS

A. STUCKI CO. Oliver Bidg. Pittsburgh, Pa.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Made of extra quality stock firmly braided and smoothly finished.

Carefully inspected and guaranteed free from flaws.

Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

PROVIDENCE

FENDERS

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Body Bushings
Bronze Axle Bearings

Bernia Pine are absolutely smooth and true in diameter. We carry 40 different sizes of case hardener pine in stock, Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them In your Prepayment Areas and Street Unia

Perey Manufacturing Co., Inc. 30 Church Street, New York Cltv

55 New Users in the Last 4 Months

KASS SAFETY TREADS present an Unusual Combination

in that they give BETTER RESULTS AT LESS COST

Manufactured and Sold by Morton Manufacturing Company, Chicago



ELECTRO-PNEUMATIC

H-B

LIFE GUARDS

METER THE ENERGY that's what you want to save

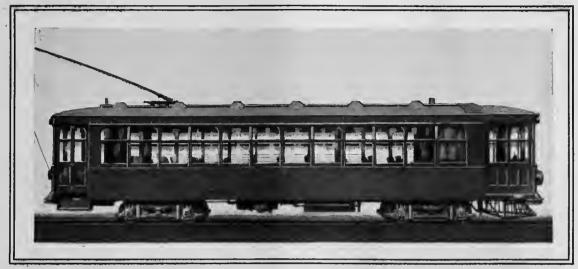
Then double the saving by inspecting cars on a kilowati-hour basis instead of mileage or time-basis. Ask for data ECONOMY ELECTRIC DEVICES COMPANY
L. E. Gould, 37 W. Van Buren St., Chicago
GENERAL AGENT: Idad Aluminum Field Colls
DISTRICT AGENTS: Peter Smith Heuten, Woods Lock Till
Fara Hores, Bemis Truck Specialtics, Miller Trolley Shoes.

ELECTRIC CAR HEATERS THERMOSTATIC CONTROL

The Consolidated Car Fender Co., Providence, R. 1. Wendell & MacDuffie Co., 61 Broadway, New York General Sales Agents

DOOR OPERATING DEVIC

Light-Weight Interurban Cars "Ride Perfectly at any Speed"



33,000-lb. Interurban Car built by The G. C. Kuhlman Car Company for high-speed service

So says Superintendent of Transportation and Equipment, Western Ohio Railway Company, before Central Electric Railway Association

Mounted on Brill Low-level trucks No. 77-E, the ten light weight interurban cars built by our Kuhlman Plant for the Western Ohio Railway Company are very satisfactorily meeting the high-speed schedule requirements and according

to this railway official "ride perfectly at any speed."

The results of their operation for the past few months are discussed in detail in the January 13th issue of the Electric Railway Journal.

Included among the advantages which these cars have demonstrated to this railway company are

> Worthwhile Saving in Power Lower Track, Car and Equipment Maintenance Easier to Maintain High-Speed Schedules **Fewer Serious Accidents**

> > Write for complete information to



In 1923

Motor replacements will lower maintenance



GE-254-140 H.P.

—And improve service

Records of a large number of railway motors which have been in service 15 to 20 years show annual maintenance and inspection costs of \$120 to \$250 per motor.

Similar records on modern G-E railway motors show annual maintenance and inspection costs of only \$35 per motor.



Investigate the savings in operating costs, and the increased reliability of service which can be obtained by replacing your older machines.



G I R G



Miller

LYGEIT

Trolley Shoes

where wire wear is less!

Chicago, No. Shore & Milw. R. R. reports:-No actual measurements of wire are taken, but condition found on inspection shows conclusively there is less wear on wire due to use of sliding contacts."

Knoxville Ry. & Lt. Co. says:—"We have never made any measurements of wear on the trolley wire but we do know we have fewer emergency calls for line breaks."

Portland-Lewiston Interurban made the tests:-Measured wire at 12 points after four months' service. Found no measurable wear at nine points and a bare .001 inch at three points. In other words, practically no sign of wire wear.

> All these companies have been using Miller Trolley Shoes in place of wheels for several years. It's time for you to try them on your road.

MILLER TROLLEY SHOE Co.

Boston-21, Mass.

Western Representative: Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.



Electric Locomotives

"Joe," said the Vice-President, "I noticed in a recent issue of the Electric Railway Journal the 'For Sale' advertisement of the Westinghouse Company, offering five new 45-ton electric locomotives for immediate delivery. Don't you think we could make good use of one of these locomotives in our freight-haulage business?"

"Boss" answered Joe, "I was just going to take up with you the matter of additional motive equipment for our freight haulage business. It has increased at such a rate that our present equipment is already overloaded. With an electric locomotive, such as the ones advertised, we can take care of all business for some time to come."

"Well, Joe," said the Vice-President, "see whether one of these locomotives would answer our purpose and what it would cost."



Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.



Westinghouse

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CONTENTS

Editorials195				
High-Speed Railroad on Eric Canal Site				
A. C. Locomotive Control				
Boston Transit Conditions Analyzed201				
The Massachusetts Commission recommends Boston Elevated Railway extensions, continuation of the present fare policy and restrictions on the use of automobiles in congested streets.				
"By the Elevated Lines" 203				
Collecting Five and Ten-Cent Fares204				
This complicated problem has been worked out in several ways, depending upon the kind of terminal station and service given. The problem is not a simple one.				
Association News and Discussions				
New York Association Holds Midyear Meeting206				
Delegates discuss the weekly pass, lubrication of railway motors, motor vehicle regulation and the installation and cost of catenary systems in a one-day session in New York.				
Regulation of Motor Vehicle Common Carrier208 By D. C. Penner.				
Reliability and Cost of Catenary Insulators				
Many Speakers at Indianapolis Utility Meetings212				
The Authority, Duties and Responsibilities of the Safety Chairman				
BY NEIL W. FUNK.				
American Association News				
Equipment and Its Maintenance215				
The News of the Industry				
Financial and Corporate222				
Traffic and Transportation226				
Personal Mention				
Manufactures and the Markets				

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What the Subscribers Think of the Journal

Commends Stand on Buses

I have always felt that the electric railway field has been very intensely and satisfactorily handled through the medium of the ELECTRIC RAILWAY JOURNAL; so much so, in fact, that I almost consider it a necessity in the operation of our prop-

There are no constructive suggestions that I have in regard to this publication, but would, however, like to commend the management upon the broad stand taken upon the transportation question, especially in the handling of bus competition. It is unquestionably a part of presentday transportation and here to stay. The manner in which you are handling this should be very highly commended.

-W. H. E., General Manager.

Of Course, Wc Think He Was Not Kidding Us

The question asked was, "Changes which in your opinion might be made," and this subscriber answered:

"None, why 'gild the lily'?"

-T. N., Claim Agent.

"You Couldn't Make It Better"—

But We Are Striving to

I am asked to tell what I think of the ELECTRIC RAILWAY JOURNAL, and to offer such criticism as I think would serve to make the paper more valuable to men in the profession. I am unable to offer such criticism, for, to my mind, it cannot be improved. All its articles are alive and up to date and if, as sometimes happens, the subject matter is not quite complete, it means that one has only to wait an issue or two and he will find the matter fully taken care of by a letter from some expert in that particular line. To my mind the entire publication is admirable and 1 cannot see how any operating man can "keep house". without it. It is the most interesting reading that comes to my desk, and I never open my copy without the assurance that I'm going to find something worth while in it. I'm hoping you will be able to keep its present standards—you couldn't make it better.

-J. L. A., Pres. and Gen. Mgr.



Compressors

To keep your cars operating on schedules which insure maximum daily mileage and earning power you must have quick, smooth, dependable deceleration. Westinghouse Air Brakes, operated with pressure supplied by Westinghouse DH "Bungalow" Air Compressors, provide a

braking system that gives you this—with a full measure of safety and economy.

Westinghouse DH Compressors are furnished in three sizes, from 10 to 25 cu. ft. displacement, to meet the requirements of the smallest or the largest cars in city or interurban service.

DH-10

DH-16

DH-25



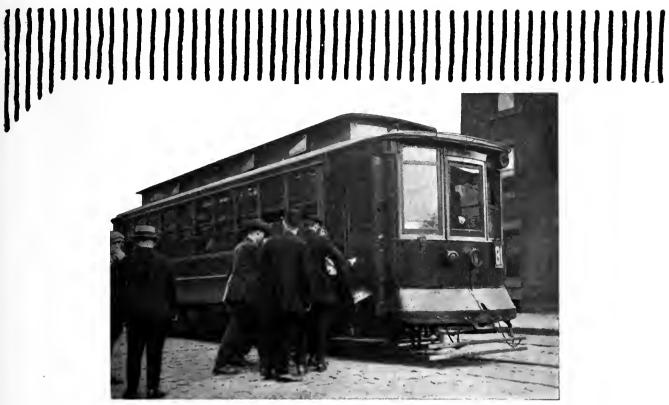
Westinghouse Traction Brake Company
General Offices and Works: Wilmerding, Pa.

Officen:

Boston Mass Chicago, Ili. Columbus, Ohio Deover, Colo Houston, Tex. Los Angeles Mexico City St. Louis, Mo St. Paul, Minn. New York Pittsburgh Washington Scattle San Francisco



WESTINGHOUSE TRACTION BRAKES



THIS CAR —and 180 others

The car shown above was originally a two-man car. It is now a Safety Car, operated satisfactorily by one man, taking in as many fares as ever. *Earning* more by *saving* more. It is one of a total of 181 which have been converted for Safety Car operation by the Philadelphia Rapid Transit Company.

Our Air Brake and Safety Car Control equipment, which makes such conversions possible and practical, can be applied to any city or interurban car.

You, too, can earn more by saving more.



Insurance plus Marsh & M-Bennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

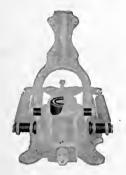
MARSH & MCLENNAN 175 W. Jackson Blvd. Chicago, Ill.

Minneapolis New York Detroit Denver Duluth Columbus San Francisco Seattle Cleveland Winnipeg Montreal London



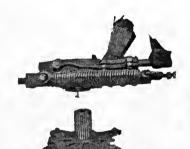
O-B Form 1 Trolley Base. (Patented)

Here are four reasons why There are others



New Base for a few cents

All points of principal wear have renewable bushings shown dark on the photograph. A few cents and a few minutes puts an O-B Base which has seen strenuous service back in perfect condition.



Accessible

One man can lift the O-B Base off its stem casting and expose every vital part for inspection and lubrication. Because it is that easy, O-B Base is sure to get whatever attention it needs.



Good Springs-well fastened

Four good springs supply the tension in the O-B Base. Ends are tapered so that more than one coil bears on the eye forging. Strain is distributed — spring life lengthened.



Buffer Spring Absorbs Shocks

If the pole leaves the wire and jumps wild, this sturdy buffer spring on the O-B Base absorbs the shock. It reduces strain on the pole, the base and the car roof.



The Ohio Brass Co.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France & Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tensian Porcelain Insulators, Third Rail Insulators

Figure the Value of Creosoted Ties On the Life Basis



The tie that lasts longest is least expensive.

SOUND, well treated ties retain their original strength and yield a life in track of two to several times that of untreated ties.

It is authoritatively estimated that this increase in tie life saves ten or more cents per tie per year. The total saving increases as the number of treated ties in track increases for the yearly tie requirements and the expense for labor in replacing and maintenance of ties is decreased proportionately.

The value and economy of treated ties is generally recognized. This is borne out by the fact that in 1860 about one-tenth of one per cent of the ties used were treated while today more than 50 per cent are treated. To obtain quality ties, you should consult the tie specialists. That's our business—one we have been engaged in for over twenty years.

International Ties are UNIFORM IN PRODUCTION because our producers are experienced in the characteristics of the timber in their territory.

International Ties are UNIFORM IN INSPECTION because the A. R. E. A. specifications are rigidly enforced.

International Ties are UNIFORM IN TREATMENT because of the high grade creosote oil and the modern mechanical devices used to insure good and effective penetration.



International Creosoting and Construction Co.

General Office-Galveston, Tex.

Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas

There is only one

best paved street track—

It's that with the lowest cost per foot per year, including first cost and maintenance. Get the figures on Steel Twin Tie track from us or from users.

The International Steel Tie Company



Steel Twin Tie Track

SEMAPHORE PROCEED STOP CAUTION PROCEED

FOR DOUBLE TRACK Interurban Railways

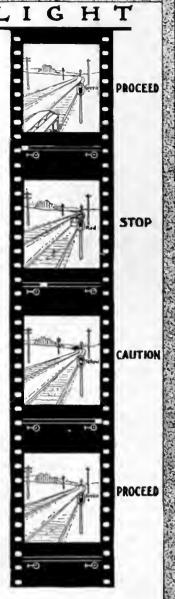
Union automatic

block signals

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.





On the W. B. & A. Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what automatic block signaling will do for your line.



Union Switch & Signal Co.

SWISSVALE, PA

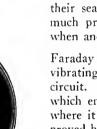
ISSVALE, PA.



Say it with FARADAY Car Signals



Type A Push Button



Push Button

No. 21022 Single Stroke Bell

Patrons do not like to depend on the conductor's memory. Neither do they like the gymnastics sometimes necessary to attract his attention to their approaching stop. And many passengers dislike to leave their seats ahead of time in order to notify the motorman. They much prefer to press the Faraday button which tells the operator when and where to stop.

Faraday High Voltage Car Signal Systems permit the use of buzzers, vibrating or single stroke bells or a combination of both on the trolley circuit. Faraday Signal Systems are supplied in several types, all of which employ the same mechanism which reduces arcing to a point where it is not sufficient to damage the contacts in any way. Approved by the National Board of Fire Underwriters.

Specify Faraday for subway, elevated, interurban, safety cars and trackless trolley busses.

For auto busses specify Faraday Battery Signal Systems.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK

CHICAGO Monadnock Bldg.

and Cambria Streets 50 Church Street M

Bronch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors:

Lyman Tube & Supply Co., Ltd, Montreal, Toronto, Winnipeg, Vancouver



No. 19587 Vibrating Bell





No. 19403 Buzzer

No. 22181 Resistance Panel

ELRECO POLES



Efficiency Plus

Something more than purely practical efficiency and economy is gained by the use of Elreco Combination Railway and Lighting Poles. The elimination of unsightly wooden poles, duplicate poles, and mazes of overhead wires, makes an improvement in the city's appearance which creates an intangible value far above the purely utilitarian one.

But don't forget that the plain dollars and cents economy of combining light and railway pole-line construction is sufficient to justify the installation of Elreco Combination Poles.

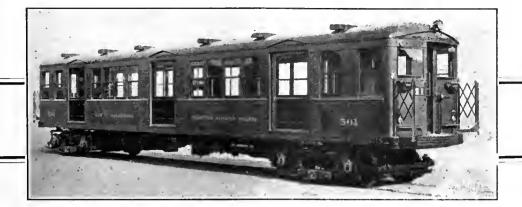
Elreco Poles possess greatest adaptability, require least maintenance, and their cost is extremely low.

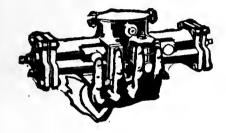
Write for illustrated catalogue.

The Electric Railway Equipment Co.

Cincinnati, Ohio

30 Church St., New York





Faster Transit— Cheaper Transit

On Philadelphia's newest elevated trains and New York's older subway trains, the most modern devices have been installed to increase speed and to reduce labor costs. Rapid acceleration and high running speeds play their part, but National Pneumatic equipment for door operation and control is equally important.

One-man control of two cars' doors with greater speed and safety is a National Pneumatic accomplishment which means annual savings of hundreds of thousands of dollars to these two great rapid transit systems.

Savings proportionate to the size and class of service you are operating are available to you also, if you use appropriate equipment. Let us figure with you on one or more of these devices.

NATIONAL PNEUMATIC

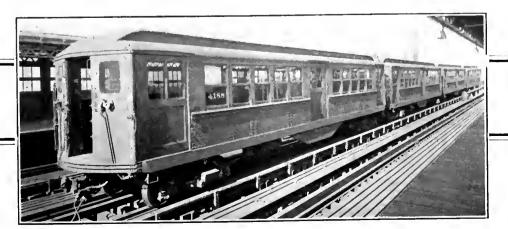
Door and Step Control
Motorman's Signal Lights
Multiple Unit Door Control

National Pneumatic Company, Inc.

Originators and Manufacturers

PRINCIPAL OFFICE: 50 Church St., NEW YORK
Philadelphia—Colonial Trust Building Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.





The Electric Arc Welder of maximum ampere capacity



Atlas Rail Grindee for removing surplus metal after welding

At standard trolley voltage (600 v.) this apparatus delivers 333 amperes. But, more important still, it is capable of high amperage when the trolley voltage is low. Even at 300 volts, a current of 200 amperes can be obtained.

Do you realize that the reason for defective, short-lived welds on railway track repairs usually can be traced to insufficient amperage? The ordinary equipment, made to work at 600 volts, fails to deliver when the trolley voltage is low. And low voltage is the ordinary rather than unusual condition on long electric lines.

With this high capacity, even under lowest voltage, Ajax Electric Arc Welder makes a deeply-penetrating, strong, enduring weld.

Ask our Agents to Demonstrate It.

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

Chicago

ALBANY



Orders 273 **ECONOMY METERS**

With Car Inspection Dials

To Completely Equip Entire System

These meters will be used to measure the individual energy consumption of every car on the property. They will afford data of high engineering value and provide a convenient means for car inspection on the basis of actual work done (Kw. hours.)

The Watchdog of Your Power and Equipment

This is a rugged watt-hour meter. Top dials for motormen's power-saving records. Lower dials for car inspection use.

When the meter-driven hand on Dial A reaches the marker set for this car at 6, the barnman knows that the brakes and controllers have done their work and are due for an inspection equivalent to that otherwise made daily.

Likewise Dial B shows when the car has done sufficient work to require oiling. This supplants the usual time or mileage period for oiling.

Dial C shows when the car has done sufficient work to require general inspection.

After any inspection the meter-driven hand is set back to zero by means of its reset rod at the bottom of the case. A lock prevents unauthorized resetting of inspection dials.

The Economy meter with car inspection dials is readily adaptable to any electric car or locomotive operating condition.

It is a "power-saving device" with a double

Let us quote you prices and answer detailed questions.

Economy Electric Devices Company

Sangamo Economy Railway Meters (General Sales Agents) Lind Aluminum Field Coils

Peter Smith Heaters Woods Fare Boxes

Bemis Boyerized Truck Specialties

Miller Trolley Shoes

1592 Old Colony Building, Chicago

UNA Bonds

There is remarkable strength in UNA Bonds. Every part of the continuous path of copper from rail to rail is strong. Just observe the bond in the photograph. Before it was possible to shear the head from the rail, 32,000 pounds steady shearing torce had to be applied—and then the shear took place through the bond head, leaving the actual weld of copper to steel intact.

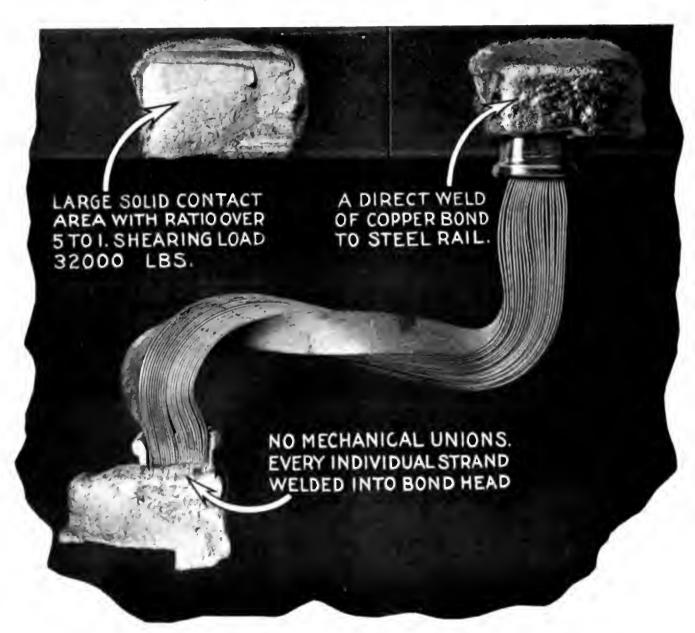
The test turther shows the—toughness of the copper in the head. This is due mainly to that wondertul allow—UNA Metal which is employed in the UNA Bonding Process.

By this method of bonding every individual bond strand is welded into the bond head as shown in the photograph. To secure this complete union, the bond is first placed in a mold against the rail. The operator then melts the bond strands in the mold and combines sufficient UNA Metal to fill the mold. By that simple operation the bond strands are welded into the head and the head to the rail.

The actual welding time required for a 4/0 Bond is about 30 seconds per head or one minute for the complete bond. The installation of 150 to 200 4/0 UNA Bonds per day with two men is not unusual on straight-away bonding. Ample opportunity is thus given to obtain bonding at low cost. In addition UNA Bonds produce maximum power savings as they are all copper from rail to rail.

Let us tell you about the new method of installing UNA Bonds with a light weight resistance welder.

Rail Welding and Bonding Company, Cleveland, Ohio





"You seem to spend a lot of time under these cars, Dick? What's up?"

"I was talking to a friend of mine about these Helical Gears. He's a fine machinist, and said he thought the end thrust would be against them, so I have been watching the thrust collars to see what the wear would be, but I can't find it. Some of the cars running on "B" Division, where the rough track is, you know, show a little wear, but not as much as on cars with Spur Gears.

"The boss says that the side push of the Helical Gear is so small that the oil film is not broken, and there is no metal to wear, and that explains it.

"These Nuttall Helical Gears and Pinions are sure winners."



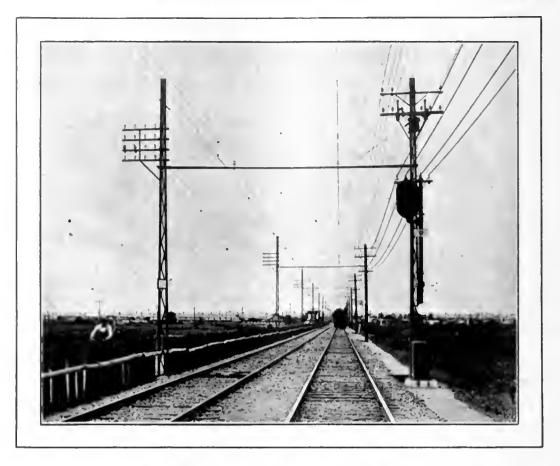


All Westinghouse Electric and Mig. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube¶& Supply Co., Ltd., Mantreal and Taranta.

EVERY GEAR REGISTERED





Permanent Overhead Construction Bates Steel Poles on the Lines of the Osaka Electric Railway

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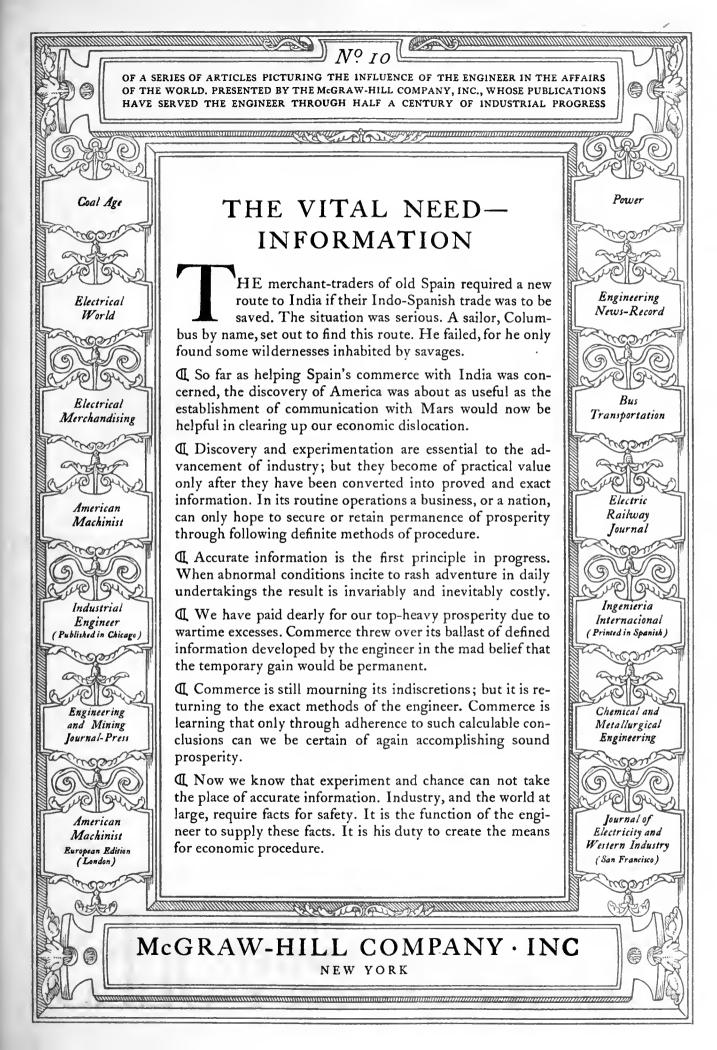
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The "PRACTICAL" Alchemist and "THEORETICAL" Robert Boyle

HE alchemists wrote vaguely of "fluids" and "principles." Copper was potentially silver.

Rid it of its red color and the "principle" of silver would assert itself, so that silver would remain. With a certain amount of philosopher's stone (itself a mysterious principle") a base metal could be converted into a quantity of gold a million times as great.

This all sounded so "practical" that Kings listened credulously, but the only tangible result was that they were enriched with much bogus gold.

Scientific theorists like Robert Boyle (1627-1691) proved more "practical" by testing matter, discovering its composition and then drawing scientific conclusions that could thereafter be usefully and honestly applied. Alchemists conjectured and died; ho experimented and lived.

Using the air pump Boyle undertook a "theoretical" but scientific experimental study of the atmosphere and discovered that it had a "spring" in it, or in other words that it could expand. He also established the connection. between the boiling point of water and atmospheric pressure, a very "theoretical" discovery in his day but one which every steam engineer now applies.

He was the first to use the term "analysis" in the modern chemical sense, the first to define an element as a body which cannot be subdivided and from which compounds can be reconstituted.

Boyle's work has not ended. Today in the Research Laboratories of the General Electric Company it is being continued. Much light has there been shed on the chemical reactions that occur in a vessel in which a nearly perfect vacuum has been produced. One practical result of this work is the vacuum tube which plays an essential part in radio work and roentgenology.





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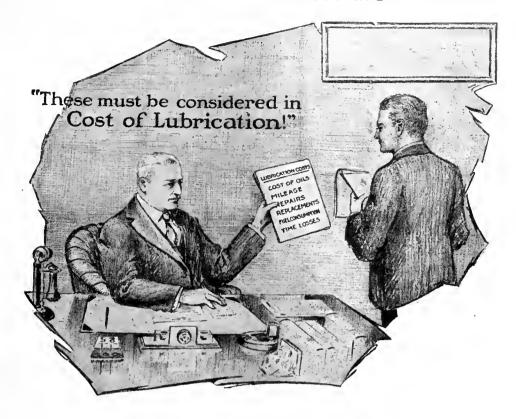
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WERE "cost of oils" the only item involved, it would be a simple matter to figure the exact cost of lubrication.

But it stands to reason that expenses arising from causes plainly traceable to deficient lubrication are as much a part of lubrication cost as the oil itself.

Practical executives are awakening to the fact that cheap oil means anything but cheap lubrication; that the losses in mileage, repairs and replacements of bearing parts, depreciation and laboralways evident with their use—make the purchase of cheap lubricants a most expensive proposition.

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ELECTRIC RAILWAY JOURNAL

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Number 5

A Convention Without an Exhibit Is Hardly a Convention

THE American Electric Railway Association committee has been appointed to determine whether there shall be an exhibit in conjunction with the annual convention next fall and where the convention shall be held. The exhibit was such a great success last year that presumably there will be little doubt among the committee members that it should again be a feature of this year's convention. To compare the interest and attendance at the last convention in Chicago with that at the two previous conventions serves to emphasize the great attraction which the exhibits make and the value of a central location. In 1920 the convention at Atlantic City with exhibits had an attendance of 3,300; in 1921 at the same location, but without exhibits, the convention attendance was 1,300, and then last year at Chicago, with exhibits, it was 4,200, with 3,300 passes issued in addition.

To exhibit, and exhibit well, is of course quite an expense to the manufacturers. But in what other way can the manufacturers get an equivalent opportunity to have such a large number of railway men see their products and to talk with them about their merits in so short a space of time? At the convention the railway men are away from their own pressing operating work and are in large measure free to give undivided attention to what the manufacturer has to say and show. Furthermore, the exhibit provides the opportunity to show devices and equipment to those many railway men who are not directly interested in their use, but who are an influence for or against purchasing such items (often depending on their acquaintance or lack of acquaintance with the subject) when sitting in staff counsels.

Another reason why an exhibit is desirable is that there is a great deal of development work going on again, now that the railways are in position to buy improvements, and this means that there will be many new devices and many improvements on old equipment which the convention will afford first opportunity for the operating men to see.

The general sentiment of the field is that a convention without exhibits is hardly a convention at all.

Atlantic City Is the Logical Location

HE Chicago convention last year was one of the best accomplishment and attendance. And we want to go back to Chicago again—perhaps in 1924—for its great pier, wonderful hotel facilities and central location make its advantages greater than any other city can offer. But this year it probably will meet with most general approval to go to Atlantic City again. There is no doubt that the Eastern ocean resort is a tremendously popular location for the railway conventions, and it might be a good scheme to alternate that city every other year with the locations elsewhere over the country. year, President Emmons, being a resident of Baltimore, quite naturally favors Atlantic City, and unless it is impossible to get a fair deal with the business interests there, the 1923 convention should logically be held in Atlantic City.

Politics No Substitute for **Judicial Inquiry**

HE recent debate in the United States Senate over I the rate of the carfares in Washington, D. C., as reported in the Congressional Record for Jan. 25, is a good example of the kind of inquiry into their finances under which utilities formerly suffered, but it was hoped that such a condition had long passed. The situation arose over the complaint of Senator McKellar of Tennessee that the present railway fares in the District of Columbia of 8 cents cash, with six tokens for 45 cents, gave too great a return on the investment in the railway properties, and he advocated a reduction to 5 cents. To compel the District public utility commission to enforce this rate, he urged that its appropriation, including salaries, should not be payable until it should fix rates of fare not in excess of those in the existing charters or contracts with Congress, which he said would reduce the fare to 5 cents. The debate brought out clearly that these salaries are a liability against the government in any case, and the effect of the amendment would be to try to withhold them unless the commission did certain things, which, if it is conscientious in the performance of its duties, it might find it could not do. Nevertheless, the amendment was defeated by a comparatively small margin only.

The Congressional Record report indicates that no evidence was presented, such as would be required in a commission hearing, as to the value of the railway properties in the District or that the proposed 5-cent fare would be sufficent to yield an income adequate to pay a fair return on these values. On the other hand, great stress was laid upon the "burden" now borne by government clerks who go to Washington to serve the government, and are charged such "exorbitant" rates by the electric railways that they have to pay \$1.50 per month more for trolley fares than if the rate was 5 cents, as it was before the war. Sympathy for these underpaid public servants on the part of the Senate is perfectly proper. Many of the salaries paid by the government are admittedly too low. But the proper place to correct this trouble is not to transfer the burden or part of it to the public utility, if it is charging only a fair price. There are many other items which enter into the cost of living and have increased far more in percentage and importance than carfare.

The action which the Senate ought to take, if it is really disturbed over the low salaries paid the government employees, is to raise the salaries. This would correct the trouble directly. The idea of correcting it indirectly by trying to cut carfares would be only a very small contribution to the government clerks, but it would reduce fares, also, to a very much larger number of people in Washington who presumably are amply able to pay them. But, when one wants to be generous, it is always easy to be so with the money of some one else, and politicians usually have this kind of generosity.

The subject has added interest just at present because of the efforts being made in some states to upset the principle of utility regulation by state commissions, which has been developed during the last fifteen years. If this movement should succeed, much of this same kind of argument in connection with utility rates will become common. There are underpaid workers in every city, and a politician can always find an excuse for asking that railway fares be reduced so that not so much will have to be paid by them for transportation. At the same time others better off financially will also pay low fares. But as Carl D. Jackson said at the last meeting of the New York Electric Railway Association, local regulation at this time, after the experience had with state control, would be a step backward and against public interest.

How Many Electric Railways Paid Stock Dividends Last Year?

THE daily papers in December contained notices of many stock dividends of 50, 100 and more per cent declared by well-known manufacturing, oil and other industrial companies. A vigorous debate has arisen in and out of Congress whether these dividends should not be heavily taxed, but to the electric railway stockholder the subject possesses only academic interest. He may read the arguments of Mr. Bedford against taxation and of some of our Senators in favor of it, but throughout the length and breadth of this land there is not an electric railway company whose stockholders as such will be affected if any such law is placed on or kept off the statute books.

If the railway stockholder should ask why he is not favored; indeed, why his company is prevented by law from declaring stock dividends, he will be told that it is because the railway is a public utility. As a utility it is not allowed to make enormous profits or to charge all the traffic will bear, like other commercial enterprises, but it must be content with a reasonable return on the investment in the property. Any greater profit would be equivalent to exploiting the public, which cannot be permitted. In return, however, and because the railway is a utility, it will be protected from unfair competition by the state, as well as permitted to earn a reasonable return on the value of its property, provided there is business to be done in the territory served.

If this condition was always followed out there might be some justice for the prohibition of high profits. But the experience of the railways proves that it is not. Otherwise, why are many of the railways in New York City in the hands of receivers, while those that are still solvent are staggering along under the burden of a 5-cent fare? Surely if these roads were permitted to charge as high a rate as the traffic would bear, they could declare 100 per cent stock dividends many times over.

All in all, the treatment of the utilities of this country by the public has been too frequently disingenuous. In the years that have passed the public nature of their work has been the excuse for limiting their gains far more often than it has served as a protection against financial disaster. These conditions are changing somewhat, due to intelligent commission rulings, but the recent recommendations of Governor Smith of New York on the subject of home rule proves that there is still much educational work to do.

Twenty Years Behind in Salaries

THE more one studies the question the more he becomes convinced that the low level of salaries is one of the fundamental ailments of the electric railway field. There seems to be a lamentable similarity between the salaries of today and those paid twenty years ago. Stories keep coming in of men who for ten, twenty and thirty years have been the faithful wheelhorses in the trying "nineteen hours a day" work of keeping the transportation machine functioning, but who have finally had to desert their lifetime work in dire need of a living wage income. The company, in such cases, usually loses a brand of loyalty and a round of experience that are difficult, if not often impossible, to replace.

Managements, of course, have been beset with the problem of making ends meet, and perhaps the conditions of the past have justified a policy of holding down hard. But is it good economy to apply this policy rigidly to the matter of salaries of the important members of the staff in all departments? Frequently, when the person of last resort, let us say the president, insists that the salary of some much appreciated employee cannot be increased \$25 or \$50 a month, the president is later confronted with the necessity of paying a substantial increase over that amount when he comes to replace the man, and, at that, replace him with a man inexperienced on the property. If this is good business or good economy, then experience counts for nought.

Compared with his responsibility, as measured in terms of the very large expenditures of money for which he may be responsible or the opportunity he may realize for big savings, the salary of any one important employee, in fact the combined salaries of the whole operating staff (if a change in one must be considered in the light of its effect on salaries of other staff employees) is insignificant. Viewed constructively, the answer to all this is that either the man should be fired or his ability should be rewarded in a measure commensurate with his responsibility and comparable to the present-day salary levels in other fields of endeavor.

The best of the run of men cannot be kept at poor or mediocre salaries. The best of those who remain become discontented and lose interest as they learn that there is no recognition of good work. With ambition stunted, they join forces with the poor employees and stay on, indefinitely, indifferent.

What has been said above in particular reference to major employees of course also applies to their assistants and the young men, for these salaries must all be scaled down from the boss'.

The remedy is obvious. And getting down to brass tacks, this salary situation is a direct reflection of the suspicion that many managements are still living in the past—by about twenty years.

High-Speed Railroad on Erie Canal Site

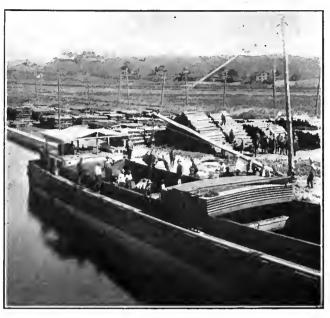
The Rochester & Syracuse Railroad Builds a Cut-Off Near the Business Center of This Important Village in Central New York, Thereby Saving Considerably in Running Time — Attractive Station Is Included in the Improvement

THE Rochester & Syracuse Railroad is a high-speed interurban serving a prosperous farming and manufacturing community between the terminal cities. The company has recently acquired additional track and facilities through taking over the Empire State Railroad Corporation. The R. & S., as well as the recently acquired property, formed at one time part of the "Beebe System" which furnished a high-class interurban service in Central New York.

In seeking ways to improve the property and the service, T. C. Cherry, general manager of the company, and D. E. Crouse, chief engineer, saw at Lyons an opportunity to clip five minutes from the schedule, furnish greatly improved facilities for handling passengers and freight and reduce maintenance costs. There was a bad jog in the line at this point, due to the fact that the railway had to be brought into Canal Street, the principal business street of the village, and out again in the fashion shown on the accompanying map. The abandonment of the Erie Canal left a vacant strip of land in just the location needed by the railroad to remove this jog and at the same time keep the line within a few hundred feet of Canal Street.

When the project was broached to the village fathers, the president and the village board gladly co-operated with the company. The necessary franchises for street

crossings were granted and the services of the board were cheerfully furnished in making arrangements with abutting property owners, facilitating the moving of some structures, etc. The village purchased the entire canal strip inside the corporate limits and sold the railway what it needed for its purposes. There was no opposition from merchants on the streets vacated because the location of the station which it was proposed to build was convenient to their stores, and in

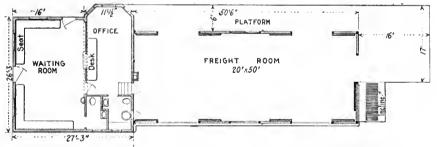


Part of These Ties Were Used on the Cut-Off

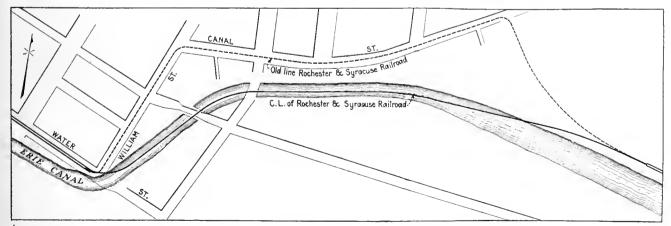
a village like this business is not substantially affected by the route so long as it is fairly convenient.

Where track was abandoned in brick-paved street the ties were left in place and the space previously occupied by the rail was brick paved. Track in macadam street was jacked out whole.

The cut-off has a length of 3,066 ft. It was built on the old tow path where possible, this being widened to accommodate double track. In other parts it was



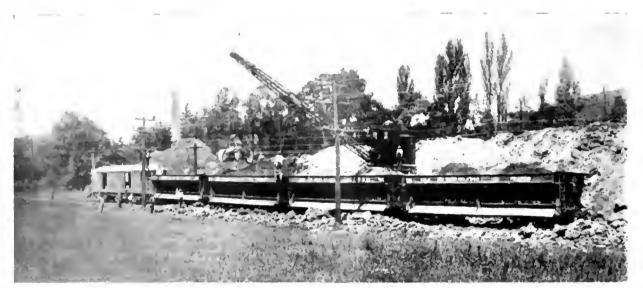
Plan of Passenger and Freight Station, Standard for Certain Types of Station on R. & S. R.R.



New and Old Routes of the Rochester and Syracuse, Through Lyons, N. Y.



New Staffon on Lyons Cut-Off, Rochester & Syraeuse Railroad



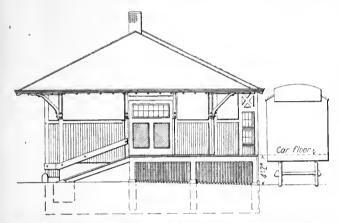
Filling Ballast Cars at Lyons Power Plant with Cluder for the Cut-Off Fill



Lyons Cit-Off on Site of Life Canal, from Point near New Station. Part of Old Canal Red Visible at Left.

necessary to make a new fill, the deepest fill, 15 ft., being between Church and Water Streets.

For the fill a total of 12,000 cu.yd. of cinder and 3,000 cu.yd. of earth was required. Fortunately for the proposition there had accumulated at the company's power house in Lyons, not far from the cut-off, an ample supply of cinder. This was hauled to the canal site in ballast cars which had been rented from the Goodwin Car Company, near Chicago, at a rental of \$4 per day on a six-month contract. These cars, of which four were rented, have a capacity of 35 cu.yd. each. They



Rear Elevation of Rochester & Syracuse Standard Freight and Passenger Station, Showing Position of Freight Car

were used for general ballasting during the summer, as well as for the Lyons cut-off. These cars were supplemented by four 80,000-lb, hopper cars which the railway company purchased.

The ties used on the cut-off were part of a lot of 35,000 yellow pine ties purchased for the season's work from Eppinger & Russell, Jacksonville, Fla. They were impregnated with creosote oil to the extent of 10 lb. per tie. They were brought by steamer and barge, and the total cost delivered on the storage piles was about \$1.50 each. The number required in the construction of the cut-off was 3,500.

The track was laid in part with old 90-lb. A. S. C. E. rails which the company had on hand, but the ends of these were cut off by means of an acetylene torch, and new bolt holes for the angle plates were punched. The balance of the track was laid with new 70-lb. rails.

COMPANY IS STANDARDIZING STATION CONSTRUCTION

The new freight and passenger station, which was part of the cut-off improvement, followed in design the standards which have been developed by the company. Experience has been utilized to produce a station which combines general convenience, attractiveness and low cost. Part of the drawings of the standard station are reproduced. A slight modification from the plan was necessary here in the freight section on account of the curvature of the track.

There is no cellar under the building, but the ground under the freight section is left 6 in. higher than grade to insure good drainage. Under the passenger section a 4-in. excavation is made, to be filled in with cinder as a foundation for a concrete sub-floor. The foundations are of concrete with $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in. crushed stone aggregate, whereas the sizes for facings and concrete floor are $\frac{1}{4}$ in. to $\frac{1}{2}$ in. Water table and sills are of local limestone. The concrete for foundation walls, piers

and footings is one part cement, two and one-half sand and five stone, with a barrel of cement to the cubic yard.

The outside of the building is sheathed with 8-in. boards, covered with building paper and with a half-timbered roughcast finish above and ceiling below. Inside, the passenger station is finished in plain red oak, with plastering above and wainscoting below. The main floor is laid with white maple on 2-in. x 4-in. hemlock stringers.

To insure dryness in the passenger station, the floor is laid on a waterproof foundation. As already mentioned, there is a layer of tamped cinders on the ground. On this is laid a 4-in. layer of concrete with coarse aggregate and a 1-in. finishing layer. Just before the wood floor is laid two layers of two-ply roofing felt are applied to this, each having a coating of coal-tar pitch throughout. The damp-proofing is carried 6 in. up the walls.

In the freight house the floor is of 2-in. matched Georgia pine. It is carried on the side walls and a row of center columns spaced 10 ft. on centers, by means of heavy pine timbers.

The cost of construction of the passenger station was approximately \$10,000 and that of the total improvement approximately \$40,000.

A.-C. Locomotive Control

Review of Plans Used for Varying Voltage in European Single-Phase Locomotives, Leading Up to Account of Inductive Regulator with Brush Shift

BY DR. IVAN DÖRY

Manager Pöge Elektricitäts Gesellschaft, Chemnitz, Germany

THE speed regulation of modern alternating-current locomotives is difficult due to the great size of the motors (up to 3,000 hp.) which are employed. These have to be controlled with easy gradations of voltage and current; the control system must be capable of providing interlocks, and the operation of the motors must be sparkless. The efforts to develop a control which fulfills these requirements have led to a great variety of design.

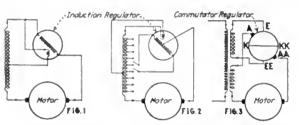
For locomotives of small capacity, the usual type of controller, which has proved so successful for the operation of direct-current street railway motors, is satisfactory, but instead of resistors for regulating the current a multi-step transformer is employed. For great capacities, however, such a controller would be unwieldy and difficult to operate; hence in large locomotives the switching of the actual operating current is removed from the controller and given over to special individual switches or contactors. The operating controller thus becomes a master controller, and the drum control is replaced by contactor control.

This arrangement permits the easy handling of large currents in many steps and the contactors can be placed in any convenient location. The master controller has to switch only a small current, it is convenient and it can be operated easily. The contactor control is, therefore, suitable for many railway requirements. It, however, lacks the interlocking feature, that is, there is no guarantee that the contactors obey the master controller, and, although many interlocking contacts are provided, a full interlocking can never be reached.

Attempts have been made to simplify contactor con-

trol by reducing the size and number of the contactors. The start in this direction was made by the development of the simple voltage divider (or voltage splitter). For example, the Siemens-Schuckert Works employed a triple voltage divider on the I-C-I express locomotives for the Prussian railroads. The Westinghouse Company, the Bergmann Works and the Swedish Almänna went even to four, six and more subdivisions of voltage.

The first use of an auxiliary transformer originated with B. G. Lamme, this arrangement requiring only half



Diagrams Showing Steps in the Development of the Induction Regulator as Applied to the Control of Voltage for Use on Single-Phase Locomotives.

Fig. 1-Induction regulator arranged for buck-and-boost connection.

Fig. 2—Induction regulator combined with step transformer. Fig. 3—Induction regulator with commutator and arrangement for shifting brushes.

as many contactors in steps. The A. E. G. (Allgemeine Elektricitäts Gesellschaft) built the auxiliary transformer as a two-winding transformer, and the author went a step further and provided for further connections on the primary turns of the auxiliary transformer and also for regulation on the secondary winding.

The Oerlikon Works built for the C + C type Lötschberg locomotive the contactors in the form of a drum located above the transformer, operated by a remotely controlled ratchet mechanism. The advantages of a hand-operated control led Brown-Boveri & Company to the design of a straight contact row arrangement similar to a storage battery cell switch, avoiding short circuiting of adjacent contacts through the brush by splitting the latter and using a switching resistor.

INDUCTION REGULATOR FOUND IMPRACTICABLE

To avoid difficulties with arcing, Prof. R. Richter suggested the use of an induction regulator, but with the usual "buck-and-boost" connection (see Fig. 1) the required output and, therefore, the weight of the regulator render-its use impracticable. He combined the regulator with a step transformer, reducing the necessary weight of the regulator. Finally, Professor Richter combined the switches in a drum coupled to the regulator in such a manner that it can be connected to the transformer only at the instant, when the position of the regulator is such that there will be zero voltage between the switch contacts (see Fig. 2). This system worked out well in service, but there are mechanical difficulties regarding the motor drive of the regulator.

The principle of brush shifting is another attractive possibility in motor control, because it gives easy gradations of control, easily controls heavy current, and is absolutely interlocked. Unfortunately, this principle of motor control is principally applicable in the repulsion motor.

For such reasons as those mentioned the induction regulator and the shifting of brushes have had to give

way largely to the contactor control, but the efforts to use them brought about further improvements in large contactors. The primary consideration with regard to regulators and brush shifting seem to be: The regulator in its usual form has to have an air gap, which results in a low power factor. The regulator requires a motor drive to overcome its torque. The brush shifting method is applicable principally to the repulsion motor, whereas the series motor suffers if brush shifting is applied to it.

It is possible, however, to combine the advantages of the regulator with those of brush shifting, by equipping the regulator with a commutator and changing its voltage by shifting its brushes. The brushes may be shifted by hand, and the regulator may be designed without bearings and air gap. In this case the brushes are shifted upon the commutator of the regulator, not upon the commutator of the motor, insuring the advantages of a permanent brush position in the latter.

Fig. 4 shows an example of such a regulator with brush shifting, as built at the Pöge Works. The commutator winding of the regulator is fed from the points E-EE shown in the diagram Fig. 3. The variable operating voltage is taken from the adjustable brushes A-AA. The common commutator winding may also be used as a compensating winding, if it is short circuited along the axis K-KK, electrically less than 90 deg. from the axis of excitation. The regulator is connected to one-half of the low-voltage winding of the transformer, while the other half of this winding is in series with the adjustable brushes and the variable operating voltage. No switches are used.

REGULATOR CONSISTS OF A STATIONARY TRANSFORMER WITH ANNULAR IRON CORE

The regulator as shown is designed for a locomotive output of 1,600 hp. continuous load. It is a stationary transformer with an annular iron core. The upper surface of its winding is built like a commutator. A sturdy

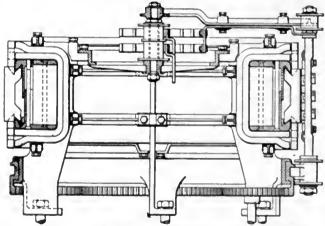


Fig. 4—Cross-Section of induction Regulator Shown Diagrammatically in Fig. 3

iron ring, placed upon columns, supports the laminated core. The commutator is solidly connected to this core, and the winding is braced to make it short-circuit-proof. The brush apparatus is attached to the regulator column. The drawing shows the regulator standing upright. It may be altered by laying it on its side.

This method of control will soon be employed for some new German locomotives, as was stated in an article in a recent issue of the *Elektrotechnische Zeitschrift*.

Boston Transit Conditions Analyzed

Massachusetts Commission Recommends Boston Elevated Railway Extensions, Continuation of Present Fare Policy and Restrictions on Use of Automobiles in Congested Streets

N JAN. 2 the Department of Public Utilities of Massachusetts submitted a special report to the Legislature on a number of special topics relating to local transportation facilities on which its opinion had been requested. These topics may be summarized as follows: (1) How to provide better transportation facilities between Boston and certain suburbs, particularly Chelsea, Hyde Park and Mattapan; (2) fares and financial condition of the Boston Elevated Railway; (3) co-ordination of the existing carrier facilities in the metropolitan district.

EXTENSION OF FACILITIES NORTH AND SOUTH

The question of the service north centers about the fact that the Eastern Massachusetts Street Railway enters Boston through Chelsea and Charleston and then over two drawbridges to Scollay Square, while part of this same territory is also served by the Boston Elevated Railway, which enters Boston through the East Boston tunnel. The latter line gives transfers to other Boston Elevated lines, whereas this is not done by the Eastern Massachusetts cars, so that there is seemingly some discrimination between the territories served. To remove this the commission recommends that the service be given by the Boston Elevated, and that about 30 miles of the Eastern Massachusetts Street Railway in Chelsea, Revere and East Boston be purchased by a political subdivision of the State to be known as the Metropolitan Transportation District, and then leased to the Boston Elevated. Somewhat the same recommendation is made for certain lines in the Hyde Park District to the south, except that in that case the city of Boston is suggested as the purchaser from the Eastern Massachusetts Street Railway, the property to be leased to the Boston Elevated, and for the purchase by the city of the Shawmut branch of the New Haven Railroad, a short spur about 5 miles in length, whose passenger business, in the opinion of the commission, could be operated to better advantage by the Boston Elevated Railway.

ECONOMIC DISCUSSION OF BOSTON ELEVATED SYSTEM

As the Boston Elevated Railway is operated by public trustees, the state has a direct interest in the matter of economical service and fares. The commission points out that the investment in the system is about \$141,000,000, of which \$44,000,000 was supplied by Boston and Massachusetts for the construction or purchase of the subways which are leased to the company. The rest of the investment in the property was provided by private capital.

There are 9,000 employees, of which the motormen, conductors and station employees number 4,700. The basic fare is 10 cents, but there are a number of 5-cent lines, increasing in number. The following are average fares at the dates mentioned: Year ended June 30, 1921, 9.820 cents; last six months of 1921, 9.349 cents; first six months of 1922, 9.009 cents; quarter ended September, 1922, 8.883 cents; November, 1922, 8.802 cents.

The maximum wage rate for motormen and conduc-

tors increased from 30.5 cents in April, 1914, to 70 cents in the fourteen months from May 1, 1920, to July 1, 1921. During the first half of 1922 the maximum rate was 65 cents an hour. Statistics are given of other items of cost which have gone up in similar proportion. Thus coal, which cost \$3.28 per gross ton at the power station wharf in 1914, went up to \$10.24 in 1920. In 1921 the figure was \$6.48.

TABLE I—SUMMARY OF PROPERTY ON WHICH DEPRECIATION CHARGE WAS BASED, BOSTON ELEVATED RAILWAY, DEC. 31, 1921

	Value of	Est.	Cent Yearly	Amount of Yearly
Description	Property	Life	Dep.	Depreciation
Railway machinery and tools Tunnels and subway equipment Elevated structure and Jounda-	\$148,099.22 514,447.76	10 25	10	\$14,908.92 20,577.91
tion Bridges, trestles and culverts Signals and int. apparatus	{7,606,517.79 { 122,357.56 {1,663,122.18 858,598.14	75 25 75 20	11/4 4 11/4 5	234,753.56 4,894.30 22,174.96 42,929.90
Telephone and telegraph lines. Shops and carhouses. Stations and miscellaneous	36,472.76 4,123,455.64	20 40	5 2 ½	1,923.64 103,086.38
buildings	3,543,908.55 39,378.95 16,948,107.54 536,870,41	50 50 20 20	2 2 5 5	70,878.17 787.58 847,405.38 26,843.52
Furniture, office appliance, sta- tion fare boxes, etc	75,621.23 237,487.65 492,104.33	20 5 10	5 20 10	3,781.06 47,497.53 49,210.43
Power plant buildings. Substation buildings. Power plant equipment. Substation equipment.	5,113,335,19 510,579,55 7,107,623,15 1,517,544,94	40 40 15 15	2½ 2½ 6% 6%	127,833.38 12,764.49 473,841.54 101,169.66
Poles and fixtures	712,637.78 1,583,824.03 3,952,011.38 959,964.30	30 50 30 30	3 ½ 2 3 ½ 3 ½	23,754.57 31,676.48 131,733.70 31,998.80
Tremont street subway-line equipment	85,487.37	30	3 {	2,849.57
	\$68,489,557.40		ha dia	\$2,429,176.43

Allowance to provide for track the use of which may be discontinued......

Total yearly accrual to provide for depreciation, pbsolescence and losses in respect to property sold, destroyed or abandoned....

75,000.00 \$2,504,176.40

The amounts charged off for depreciation have also been increased. For the three years previous to the acquisition of the property by the state trustees, the amounts allowed had averaged a little over \$300,000 a year. Table I gives the basis used by trustees for determining the depreciation charge. In consideration of this summary and the detail tables accompanying, the trustees determined that the amount of \$2,004,000 per year should be charged to depreciation. In fixing the amount for depreciation, the property excluded from consideration was that listed as obsolete, not used, or non-depreciable (like land) and that older than The value of this property aggrethe estimated life. On an investment in road and gated \$26,351,872. equipment of \$94,841,429, the company made during the year ended June 30, 1922, expenditures for maintenance of way and structures and equipment of \$5,286,949, besides the allowance for depreciation of \$2,004,000. Thus the total for maintenance and depreciation during this period was \$7,290,949. Comparison of this depreciation allowance with that of other companies, as given in the report, is shown in Table III.

The total expenditures made by the company for improvements and charged to capital account since July 1, 1918, were as shown in Table II.

The commission then points out that if the company was required to introduce a 5-cent fare over all of its lines, the deficit, which would amount to from \$10,000,000 to \$12,000,000 a year, could be made up only from taxation. It adds that while low-priced local transportation admittedly is a good thing for a community, if this plan of defraying part of the cost from taxation should be followed, it would be difficult to say where it

TABLE II—EXPENDITURES ON ROAD AND EQUIPMENT, BOSTON ELEVATED, JULY 4, 1918, TO SEPT 4, 1922

Elevated structures and appurtenances. Surface lines.	\$270,257.97 2,384,822.46
Car bouses and shops. Power houses and transmission of electricity.	1,515,669,66 2,297,660,01 7,583,149,14
Miscellaneous	279,702.58
Total	\$14,831,261.82

should end. It is hard to say that transportation is any more vital to the well being of a community than electricity, water and gas, or the principle might be applied to housing, fuel, food, clothing, etc. The commission does not think that the state should assume this burden and believes it to be the wiser policy for people to pay for what they get when they receive it. It is argued, it is true, that as automobile riding increases car riding will diminish and car fares will increase, and that is very unjust to those who have to ride in street cars, but the commission believes that the automobile question is a problem which should be dealt with and solved as such. The time has come, in its opinion, when the expenses which the automobiles impose on the community ought to be paid by them, and the commission is therefore all the more opposed to any suggestion which looks like burying these expenses still further in the general tax rate.

Several bills presented to the Legislature last year provided that the common stock of the Boston Elevated Railway Company should be purchased by the state or one or more of its subdivisions, so as to become publicly owned. This stock aggregates \$23,879,400 par value and now receives a dividend of 6 per cent per annum. All of the securities aggregate nearly \$100,000,000. The various subways are publicly owned now, and this seems to be going far enough in the direction of public ownership, and the commission recommends that the present status be given a longer test.

Another suggestion is that subway rentals should be remitted for the future on the plea that the subways are nothing but underground highways and hence pay a fair sum for their use of the highways. For similar reasons the commission does not approve the suggestion of remitting the corporate taxes of the Boston Elevated Railway Company.

The commission was requested also to investigate the transportation service and facilities within the metropolitan district, and whether the different means could be co-ordinated. A study was made, and a central planning body able to develop plans for the future along comprehensive lines for the relief of congestion, together with provision for the proper distribution of the cost thereof, was recommended. The commission finds that the greatly extended use of automobiles has created a serious situation which requires immediate study and prompt relief.

The motor truck, owing to free use of the roads, has been seriously injuring the steam railroads, and also greatly increasing the maintenance cost of the roads to the injury of the public. It should be made to pay properly for its use of the highways. The passenger automobile also seriously affects the receipts of the railroads and the street railways. Interurban traffic on street railways in many localities is moribund. Besides this, the automobile has become the biggest electric railway hazard and costs street railway companies large sums in safety measures and in suits.

Automobile travel also affects injuriously street railways in other ways. Thus, it was recently suggested that the Harvard Square subway entrance should be removed at a substantial cost to the railway to make this square safer for rerouting automobiles. Petitioners have asked that one-man cars in Malden be prohibited because of the congestion due to these cars and the unrestricted parking of automobiles. In Boston the street congestion is such that unless some effective restriction of traffic in the center of the city is adopted, tunnels and additional highways will have to be built for motor and other vehicular traffic, and foot travel is slow and dangerous.

The commission sees no alternative except that such tunnels and additional highways should be built or else that areas should be created in the heart of Boston from which all automobiles are excluded, except for certain business purposes or during certain hours of the day, and the latter course is the one which should be carefully considered. Such a course would probably mean congestion in traffic and parking outside this restricted area, so that the matter should be considered as a Metropolitan District matter. On this general

TABLE 111-COMPARISON OF DEPRECIATION ALLOWANCE YEAR ENDED DEC. 31, 1921 Per Cent of Railway Per Cent of Railway Operating Revenues Per Car-Mile. Investment in Road and Road and Operating Revenue Revenue Car-Miles Equipment Depreciation Expenditures Cents Equipment 9,750,116 22,149,606 118,446,044 35,708,800 \$340,693* 1,162,132 4,827,498 816,600 2,004,000 3.5 5.2 4.1 2.3 4.0 1.9 \$19,097,224 15,030,126 160,610,560 78,743,000 \$5,501,200 9,573,885 60,205,794 16,332,800 1.7 6 2 12 1 8.0 4 9 7.7 3.0 1 0 2 1 6.0 95,991,673

should be free. The remission of these rentals would amount to about \$2,000,000 a year. This would benefit the car rider materially, but the commission does not recommend it, however. In the first place, it would increase the tax rate. Then, the same arguments apply also to the elevated structures, which are nothing but overhead highways. The better plan is to follow the opposite policy, i.e., to require the street railways to pay for the subways, tunnels, elevated structures, etc., and have other vehicular traffic, especially automobiles,

subject the commission recommends the creation of a division of metropolitan planning of the Metropolitan District Commission, to consider among other things (1) proper compensation for the use of highways and bridges by motor vehicles; (2) the creation of areas in congested districts from which motor vehicles would be excluded wholly or partially; (3) the subjection of operators of motor trucks for hire to the jurisdiction of this department to the same extent and in the same manner as other well-recognized common carriers.

[•] On 3 per cent sinking fund basis. If on a straight line basis charge would be \$470,777,99,



IN THE expansion of its publicity work the Chicago Elevated Railroads is utilizing hand-painted bulletin boards, the reproductions of which above merely indicate the subject portrayed, for a photograph cannot bring out the contrast and art of the original. The six views shown have been placed in twenty-five different locations about Chicago, principally in the out-

lying districts within a short radius of the elevated where people can use the service but where the structure is not in view. The purpose is to get people talking about the posters as a work of art and in so doing have them naturally form a favorable opinion of an advertiser who uses such high-class copy in appealing to the traveling public.

ELEVATED LINES

Collecting Five and Ten-Cent Fares

This Problem Has Been Worked Out in Several Ways in Boston, Depending Upon the Kind of Terminal Station and the Service Given—Problem Is Not a Simple One

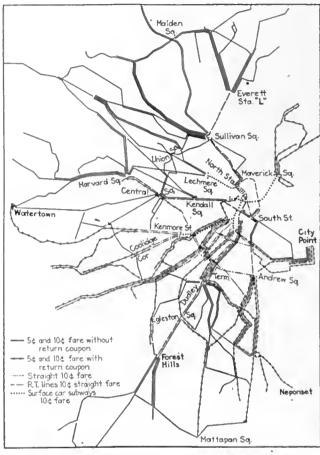
READERS of this paper generally are familiar with the principles of the Boston Elevated Railway's fare system. From July 10, 1919, up to the spring of 1921 the fare was 10 cents, but beginning with April of 1921 a system of 5-cent fares for local rides was established in the suburbs. Within Boston, however, with the exception of one or two short lines and between Boston and all of its suburbs except South Boston and Charlestown, the fare remained 10 cents.

The general arrangement of the lines of the Boston Elevated Railway facilitates the collection of these two fares reasonably well because most of the traffic entering Boston does so through the terminal stations of the rapid transit divisions of the Boston Elevated Railway at Andrew Square, Dudley Street, Harvard Square, Kendall Square, Leehmere Square, Sullivan Square and Everett Square. At each of these points passengers going to Boston from points farther out change from a surface car to a rapid transit line so that each of these points forms a logical zone limit. Moreover, at most of these points there is a prepayment area where passengers formerly, when a flat fare was charged, transferred directly between surface and rapid transit With the introduction of the 5-cent fare for suburban rides, therefore, these prepayment areas proved most useful in separating the 5-cent and the 10-cent passengers. Actually the problem is not so simple as this, because all of the suburban surface ears do not run into prepayment stations where there are inclosed areas into which the passengers can unload

At places where these prepayment areas exist, as at Everett Station, Sullivan Square Station, Harvard Station, Dudley Station, Forest Hill Station and Lechmere Station, local passengers in inbound cars pay 5 cents on leaving if they get off before they reach the prepayment station. Otherwise, they drop 10 cents in the fare box on the rapid transit platform after they leave the surface car and as they enter the rapid transit station. Local passengers on outbound surface cars pay 5 cents on entering the car.

A second condition exists where surface lines run to rapid transit terminals in the suburbs where it was not feasible to provide inclosures and collect the fares when the passengers leave the surface cars. In this case all inbound passengers pay a 10-cent fare, but if a passenger expects to leave the surface car before he reaches the prepayment station he asks for a "warrant." which entitles him when he leaves the car to a "return coupon." This is good for an outbound local fare within a period ranging from ten to forty days, so that the local fare is virtually 5 cents each way. It should be remembered that a considerable number of these local cars in the suburban areas are operated by one man.

According to the rule under which the 5-cent fare was extended to the suburban districts, the fare applies only to rides where a transfer is not used. Hence, warrants are not given except in certain specified cases



Map of Bosion Showing Lines Classified as to Fare

where the local passenger offers a transfer to the conductor.

This system is used for cars running to Maverick Square, Andrew Square, Egleston Station, Broadway Station, for certain lines to Dudley Station and at a few other points.

Finally, there is another situation where lines do not run to prepayment stations but where it is practicable for both kinds of fares to be paid on the cars. This applies to most of the lines running to Kendall Square and Central Square in Cambridge, the line from South Boston to Dewey Square and Rowe's Wharf, the line between South Station and North Station and one or two others. In these cases the 5-cent fare entitles the passenger to a ride as far as the car goes, whereas a 10-cent fare entitles him to a transfer to some other surface car or the rapid transit system.

Reproductions of a typical warrant and a return coupon are shown herewith.

TRANSFERS NOT PUNCHED ON TRIP

The Boston Elevated Railway has a number of forms of transfers for different conditions, but the most common form is that illustrated on page 205. This transfer was put into use on Division 2 on Nov. 1 and

will probably be put into use on the other divisions shortly. It is a modification of the form shown in the ELECTRIC RAILWAY JOURNAL for Aug. 26, 1922. The chief feature of this transfer is, of course. the method of indicating the hour of issue by tearing off the transfer at the proper line. This enables the conductor to issue the transfer without punching the time. It has also been possible to dispense with the punch for the route on which the transfer is good by making it good on all routes except the route which would take the passenger back to his starting point, and this is indicated by a nunch made by the conductor before starting on his trip. The transfers have the month printed on the face of the check, in red, and the days of the month from 1 to 31 printed around the edge. The transfer is punched for the day of the month at the carhouse before it is issued to the conductor. To facilitate

15 * BROVE 5T. ** ROBLINGALE ** SPRING ST. ** CITY PROPER ** SORDOIN SQ.	2 3 4 5 6
12 * BUDGEY STATE OF THE PROPERTY OF THE PROPE	3 4 5 6
12 * ESLESTON RORTHAMPTON * 2: 13 * FOREST NILLS 14 * AYDE PM. LIRE 15 * BROVE ST. 16 * ROBLINGALE 7 * SPRINS ST. 17 * CITY PROFER 18 * BONDON SQ. 20 20 2 * EMERGENCY 22 24 25 27 28 29 20 20 20 20 20 20 20 20 20	5
13 * FOREST MILLS 14 * NTOE PYL LINE 15 * SROVE ST. 16 * ROBLINGALE 17 * CITT PROPER 18 * SOUDOIN SD. 20 21 22 24 25 26 27 26 27 27 28 29 20 20 20 20 20 20 20 20 20 20 20 20 20	5
14 * AVOE PK. LIRE SOUR ST. SOUR ST. SOUR ST. SOUR ST. CITT PROPER ST. SOUR	6
15 * BROVE ST. 16 * ROBLINGALE ** SPRINS ST. ** CITT PROPER 18 * BOWDOIN SQ. EMERGENCY 2 2 2 2 2 3 2 4 2 4 AM THIS TRANSFER STEARS 4 AM	6
17 * SPRIAS ST. 3 * CITT PROPER 18 * SOUDOIN 80. EMERGENCY 2 19 * COOD ONLY UNTIL 3 20 * Z AM PRIS TRANSFER TICKET 4 AM	
17 * SPRIAS ST. 3 * CITT PROPER 18 * SOUDOIN 80. EMERGENCY 2 19 * COOD ONLY UNTIL 3 20 * Z AM PRIS TRANSFER TICKET 4 AM	
17 * CITY PADFER SEZ PARTIE SEZ P	7
18 * BORDOIN 80. EMERGENCY 2 19 COOD ONLY UNTIL 3 20 2 AM PRODUINS OF USE OF 3 4 AM	8
20 2 AM PRODUCTIONS OF USE OF 3 4 AM	9
4 AM	80
	31
6	
U AM	
SEE OTHER SIDE FOR CONDITIONS OF USE OF THIS TRANSFER TICKET 7 AM	
8 AM	
9 ам	
10 AM SEE OTHER BIDE FOR CONDITIONS OF USE OF THIS TRANSFER EIGHET	_
11 ам	
12 NOON	

Present Standard Form of Boston A.M. Transfer. No Punching on Car Is Required

the proper use of the transfer it is stapled at the bottom, so that the pad carries the stubs as well as the transfers

The company varies the colors of its transfers with the division at which they are employed so that there

WARRANT 20 Exchangeable only on this car and trip for a return coupon, if passenger leaves car at or 6 before entering 1. Subway at Public Carden 2. Massachusetts Station Not good for fare on any car or at any station. BOARD OF TRUSTEES **BOSTON ELEVATED RAILWAY**

RETURN COUPON SEPT. 30, 1922 **OUTBOUND LOCAL FARE** BETWEEN PUBLIC GARDEN STATION AND LONGWOOD AVE. ON IPSWICH BT. CARS TERMINATING AT LONGWOOD AVE. NOT GOOD AT ANY STATION Not Redoemable. Not Transferable. BOSTON ELEVATED RAILWAY 45409 THEllelow

The Local Suborban Passenger Receives a Warrant When He Pays His 10-Cent Fare and Exchanges This Warrant for a Return Ticket if He Leaves the Car Within the 5-Cent Limit

Form 599

is less chance for their improper use. Thus on one division it will issue straw paper for a.m. and mandarin paper for p.m., and on another division lilac for a.m. and green for p.m. It also distinguishes the transfers

issued by the rapid transit lines from those issued by the surface lines by printing them with red ink, while those of the surface lines are printed in black ink.

All transfers received from passengers are turned in at the carhouses, where they are counted by a tickometer. These machines are very rapid. The transfers are then sent to the treasurer's office.

Coin-counting machines are also used extensively in the treasurer's office, the type employed being the Sattley, which not only counts but wraps the coins. The locked fare boxes are collected every morning by auto truck, and as there are very few pennies in them these are first taken out by hand. This leaves only the nickels and dimes, and each counting and wrapping machine can count \$2,500 worth and wrap them in an hour.

From the machine the wrapped coins are put in bags and the bags are checked by weighing them before they are sent to the bank. Roughly speaking, one-half of the receipts a day are received in locked fare boxes and one-half through station agents or in recording boxes.

All used transfers are canceled by a macerator which is operated by one man, who also bales the macerated tickets. Macerated tickets are then sold as waste paper for \$20 a ton.

Fifteen Million People Live in Zoned Cities

ORE than 15,000,000 people live in zoned cities, I towns and villages, according to information made public recently by the Division of Building and Housing of the Department of Commerce. Zoning regulations provide, by a neighborly kind of agreement, that a city or town shall be divided into districts in which the uses for which structures may be built, their maximum height and the area of the lot which they may cover are established. In line with the zoning plan, certain districts are set aside for residences, for apartment houses, for office buildings and for manufacturing.

During 1922 zoning spread especially rapidly in smaller places. Fourteen towns with five to ten thousand inhabitants were zoned during the year, bringing the total zoned towns in this class to twenty-three. Twelve places with 5,000 inhabitants or less were added to the list in 1922, bringing the total in that class to seventeen. The percentage of large cities which have already zoned remains much greater, of course, and of the fifty largest cities in the country, twenty-two have zoning ordinances in effect. New York has been zoned since 1916, and 81 per cent of the urban population of New York State lives in zoned municipalities. California ranks second among the states with 71 per cent of her urban population zoned; Minnesota, third, with 58 per cent; New Jersey, fourth, with 57 per cent; and Utah, fifth, with 55 per cent. The entire District of Columbia is zoned.

The electric railways of New York City will show a net profit for the present fiscal year, which ends June 30 next, according to a report of the statistical department of the Transit Commission. The conclusion is arrived at by analysis of the reports of the various companies for November, 1922. The result for all companies for November was a profit of \$61,696, an increase of \$170,170 over the same month in 1921. The winter season is proving a profitable one for the rapid transit lines of the dual system. The Interborough Rapid Transit Company earned a net profit of \$58,164 and the New York Consolidated Railroad \$104,248.

Association News & Discussions

New York Association Holds Midyear Meeting

Delegates Discuss the Weekly Pass, Lubrication of Railway Motors, Motor Vehicle Regulation and the Installation and Cost of Catenary Systems in a One-Day Session in New York

THE regular midyear meeting of I the New York Electric Railway Association was held at the Commodore Hotel, New York, on Jan. 25, 1923. There were morning and afternoon sessions and in the evening a banquet. A short account of the meeting was published in the last issue of this paper. B. E. Tilton, president of the association and vice-president and general manager New York State Railways (Syracuse lines), presided at all three sessions.

THE WEEKLY PASS

The first paper was that on the "Selling Principle of the Weekly Pass," Walter Jackson, Mount Vernon, N. Y. This was printed in abstract in last week's issue.

Mr. Jackson, before presenting the paper, gave some further particulars in regard to the pass. He said that one British road had just decided to put in the pass. Up to this time, the form of pass or commutation ticket sold abroad has been for such long periods that only the wealthiest patrons could afford to buy the cheapest form of transportation. While the pass permits unlimited service, the objections which apply to the supply of unlimited service by any other municipal utility do not apply to an electric railway. With a gas or water company a man could turn on all the cocks in his house and go to the ball game. The railway pass, however, requires the time of the owner to be of value. In Chicago it has been found that a pass traveler rides about twenty-two times a week. In a city of from 50,000 to 75,000 inhabitants, the passholder would ride a larger number of times because he would go home to lunch, but there is of course a limit to its use in any city, and practically all use except two rides a day will have to be in the off-peak hours.

It is desirable to make the pass as convenient as possible for customers to buy it and use it. For this reason the usual form in which it is sold is better than if a punch card is used, as on some roads, because with the latter the customer naturally will endeavor to figure with each pass purchased whether he is shead or behind the company at the end of the period. Moreover, punching requires the time of the conductor or operator. speaker recommended that the number

of pass riders be registered, but all companies do not do this. Where it is done, it is done on an old register or on a counter used for registering telephone calls. Such a counter can be purchased for about \$3.50. Several companies check pass rides at intervals. A record of the number of the pass rides is helpful to prove to a regulating commission that the average rate given by the railway is low. Then, where a fare complaint is made, it is provable that the complainant is a eash rider and consequently not a regular rider.

In connection with his paper Mr. Jackson showed various window and other posters which had been prepared for use in Chicago and elsewhere to assist in the sale of the pass. In many cases the poster incidentally advertised the local movies, theaters, art museums, ballgrounds, etc., in explaining how a passholder could reach these resorts in the evening without additional fare. This has created a great deal of good will and had led to reciprocal courtesy on the part of these institutions or enterprises. Some of the posters prepared for the Chicago Elevated Lines were particularly attractive. (The ELECTRIC RAILWAY JOURNAL has prepared a page illustrating these posters. This page is shown elsewhere in this issue.)

DISCUSSION ON PASS

The first discussion on the pass was a letter received from Samuel W. Greenland, vice-president and general manager Indiana Service Corporation, Fort Wayne, Ind. The letter was read by Clinton E. Morgan, Brooklyn City Railroad.

Mr. Greenland's letter contains a tabulation by weeks from Jan. 1, 1921, to Jan. 14, 1923, of the city line earnings with the number of passes sold. Passes were put on sale for the first time in the week ended March 5, 1922, and up to that time nearly every week in the year had shown a decrease in gross receipts over the corresponding week in the previous year. Beginning with the second week of the pass, however, the condition changed, and only one week since that time shows a decrease over the corresponding week of the previous year. The number of passes sold have gradually been increasing from 2,967 during the first week to 6,954 in the forty-seventh week. In addition, the letter from Mr. Greenland sald in part:

We estimate Iwenty-five rides per week per passholder. This, we think, is quite conservative, and it is possible that this number should reach as high as thirty rides per week.

Our present fare is now and has been since before the pass was introduced 7 cents cash, 64 cents for tokens, and the pass sells for \$1 a week. In analyzing our revenues for the last seven weeks of 1922, we find the revenues divided as follows: Cash, 11.45 per cent; tokens, 61.29 per cent; passes, 27.26 per cent.

In our opinion the pass has done more to improve our relationship situation than anything that has been done on our property, and I am very frank to say that whave not at any time had any criticism of the pass or its operation. On the contarry, we believe it has made innumerable friends for us and our service. We operate ahout 45 miles of track in Fort Wayne, and 100 per cent one-man cars, and are continuing to advertise the pass practically every week, using the car card method.

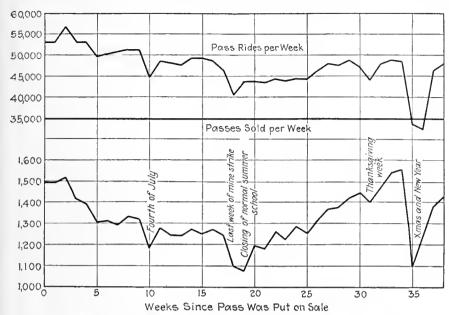
We pave and maintain the pavement believen our rails and for I ft. on either side, and have not at any time had any jitney competition. The operation of such competitive service, we helieve, has been forestalled by the furnishing of frequent headways on all of our lines, by the use of the one-man car.

THE PASS IN BEAVER VALLEY

W. H. Boyce, general manager of the Beaver Valley Traction Company, New Brighton, Pa., then told of the results obtained from the use of the weekly pass on his lines. He said they have a zone system of fare collection with a 5-cent fare for each zone. They began using the pass in February, 1922, and the revenue increased from the start. While it is somewhat difficult to say just how much of the increase is due solely to the pass, their investigation showed that for the first five months fully 70 per cent of the increased revenue was due to the sale of the pass. Passes were sold for use in one, two or three zones. As 96 per cent of the revenue came from rides of three zones or less, the three-zone pass after eight weeks was changed to one good in all zones. When a holiday occurs, the sales for that week drop off from 35 per cent to 40 per cent.

Mr. Boyce described the manner in which the school pass was introduced on his system. They charge 75 cents per week for a universal school pass good between the hours of 8 a.m. to 4:45 p.m. and the revenue from these passes now amounts to \$235 per week. An advertisement for the Gas & Electric Shop is run on the backs of passes, which reduces the cost of printing. The various merchants are enthusiastic over the use of the pass and put on special sales and co-operate with the railway. The railway company spent about \$300 in advertising the pass at the start but has not spent any since. Relations with the public have been made much better through the use of the pass. The railway is getting more money and putting more riders on the ears during periods of least riding.

The next speaker was E. M. Walker, general manager Terre Haute Traction



Passes Sold and Passenger Revenue in Terre Haute Since Pass Was Put on Sale (May 1, 1922)

& Light Company, who said that electric railway business conditions had changed greatly in the last ten years. Formerly, city transportation business was largely a monopoly. Now, it is highly competitive because of the private automobiles and sometimes be-The pass is a very cause of jitneys. good means of combating both of these means of transportation and has so proved in Terre Haute. The price in Terre Haute was set at \$1 a week, or equivalent to twenty rides, and the company sells about 1,500 passes a week. Mr. Walker showed a chart of the number of passes sold by weeks, pointing out that in a week with a holiday, such as Christmas, the sale of the pass drops off 30 per cent. Although other lines of business in Terre Haute had felt the effect of the coal strike, the gross earnings of the railway company have shown very little variation.

In reply to a question, Mr. Jackson gave it as his off-hand opinion that the saturation point for number of passes in a city was about 15 per cent of the total population.

MOTOR LUBRICATION

The next paper presented was "Lubricating Railway Motors," by L. M. Clark, published in abstract on page 175 of the issue of this paper for last week.

The principal discussion of Mr. Clark's paper was presented by L. J. Davis, mechanical and electrical engineer for the Brooklyn City Railroad, who said that the mechanical department of every electric railway is handicapped, in its efforts to lubricate railway motors, in a number of ways, some of which are not generally recognized. To begin with, the suppliers of lubricating oils and greases have for many years so diligently pursued the elusive oiling contract, which is generally based on the first cost of the lubricant and not on the main-

tenance cost of the parts lubricated or other details affected by these parts, that a magnified importance is given to the first cost of lubricant on many properties. The periodic oil report on its special form has a psychological effect on many managers which is entirely out of proportion with its real importance.

It is admittedly more difficult to analyze such items as bearing costs, gear and pinion costs, motor failures and delays to service, in their relation to the reduction in cost of lubricants than it is to accept such reductions as a mark of business acumen in the purchasing department, or managerial ability.

Suppliers of waste urge the purchase of a product whose advertised virtues are of such number as to be comparable with the latitude allowed the assembler in the selection of its constituent parts. These range from yarn made of wool to the fibrous covering of the cocoanut. These combinations of materials, whose sole virtue frequently is low first cost, are sometimes purchased and must be used.

The motor designer in his efforts to produce a lighter and lower priced product often finds that he can do so if the bearings are reduced in certain dimensions, if the armature speeds are increased, if a cheaper babbitt is used, or accessibility of lubricating details is sacrificed. The first cost is reduced but at the expense of lower lubricating efficiency and increased maintenance costs.

The truck designer, under instructions to produce a lighter and smaller truck, is sometimes forced to reduce the space allotted to the motor. This results in making the oil openings of the motor less accessible to the oiler. The car body designer endeavors to provide a low-floor car, but in doing so reduces the space between the motors and car flooring to such an extent that

motor oiling on some cars has become most difficult.

These, Mr. Davis said, are some of the handicaps to successful motor lubrication. Some are the result of a misconception of efficient operation, some are due to lack of judgment as to what constitutes real economical purchasing, some to forced buying of the lowest priced product on account of financial conditions, others to the trend toward faster operation of cars and the necessity for lowered power costs.

A study of the lubrication problem on the surface cars on a large property showed that there was a considerable amount of trouble with babbitted bear-This trouble was in a great ings. measure due to the peening and breaking of the babbitt caused by the pounding incident to cars passing over much special work and some bad joints. It was decided to change to solid bronze bearings with no babbitt and untinned. This change is being made with satisfactory results. Reduction in the frequency of oiling of some of the older type motors was another matter which it was decided was highly desirable. It is felt that with the elimination of babbitted bearings and the installation of a new oiling device a number of the handicaps to the satisfactory lubrication of the motors on this property will be removed, thus giving better per-

At the conclusion of Mr. Davis' discussion, C. E. Morgan of the Brooklyn City Railroad requested that Mr. Clark explain the details and theory of the vacuum oiling device which the Railway Improvement Company is marketing. Mr. Clark explained this by use of a lantern slide. A description of this device was published in the ELECTRIC RAILWAY JOURNAL for Oct. 29, 1921, page 781.

MOTOR VEHICLE REGULATION

The next paper read was one on "Fundamental Principles of State Motor Vehicle Common Carrier Regulation," presented by D. C. Fenner, chairman Motor Vehicle Conference Committee of the National Automobile Chamber of Commerce. An abstract of this paper appears elsewhere in this issue.

In calling for a discussion on this paper, Chairman Tilton said that in his opinion the automotive vehicle is here to stay, and those interested in it and electric railways should work together in connection with legislative problems.

In the discussion Walter Jackson questioned the practicability of having the fees from automobiles devoted to special highway purposes. He thought that these in time would go into the general treasury of the state.

Mr. Fenner said he thought that the highways should be constructed by the general public but the maintenance should come from the motor vehicles.

H. W. Blake thought that the tendency was toward a greater regulation of automotive common carriers and that such regulation was desirable for both public and carriers. Free com-

petition is sometimes advocated as a means of securing fair rates, but that was tried originally with the railroads and later with the electric railways and had given place to regulation and exclusive franchises, which had proved more desirable.

The final paper at the technical ses-

sions was on insulation of catenary and other power and railway systems and was presented by Arthur O. Austin, chief engineer Ohio Insulator Company. It was illustrated by lantern slides. There was no discussion. At the conclusion of the presentation of this paper the meeting adjourned.

Regulation of Motor Vehicle Common Carrier*

Twenty-two States Now Provide for Control of Motor Vehicle Common Carriers-Position on this Matter of Motor Vehicle Conference Committee

> BY D. C. FENNER Chairman Motor Vehicle Conference Committee of the National Automobile Chamber of Commerce

URING the course of the present year the legislatures of forty-three states will meet in regular session. If 1921, when a similar condition existed, is any criterion, there will be introduced and considered by the lawmakers of these states fully 2,500 bills directly or indirectly affecting the production, sale and use of motor vehicles.

many of these Unquestionably measures will deal with the problem of governmental regulation of the motor vehicle when used as a common carrier.

What is meant by the expression motor vehicle common carrier?

Motor vehicles are subjected to two general but distinct uses: First, they are privately employed by their owners for the transportation of persons or property. Second, for the transportation for hire of the persons or property of others than their owners.

Until a few years ago the legislatures of our forty-eight states in no way differentiated between these various uses of the motor vehicle in the laws which they enacted dealing with operating requirements, registration fees and the many other subjects which are usually found in a state's motor vehicle laws. In 1914, however, Pennsylvania definitely segregated motor vehicles when used as common carriers and placed them under the regulation of the State's public service commission. Today the laws of twenty-two states provide for a greater or less degree of such state control. Without exception state regulation of motor vehicle common carriers has been vested by law in pre-existing state agencies that exercise control over other forms of common carriers such as railroads, trolleys, telephone and telegraph lines, pipe lines, etc.

A few states deal with the subject merely from the standpoint of local control, the incorporated municipalities being given power by the state legislature to require motor vehicle common carriers to obtain permission and a license for operating from the local governing body. This is the case in Massachusetts, where the Board of Selectmen of the City Council exercises control over motor vehicle common carriers transporting passengers.

With very few exceptions the powers wielded by the public service commissions or similar forms of state agencies over common carrier transportation by motor vehicles are extremely numerous These powers are as and broad. follows:

- 1. Grant, refuse to grant, amend or revoke certificates of public convenience and necessity.
 - 2. Prescribe routes.
 - 3. Fix schedules.
- 4. Determine character of service and promote the comfort and safety of traveling public.
 - 5. Establish fares and rates.
- 6. Require reports and uniform methods of accounting.
 - 7. Examine accounts and records.
- 8. Supervise fiscal affairs such as incorporation, capitalization of stock, etc.
- 9. Compel additions to, extensions of, or betterments in physical equipment.

It is apparent that these powers are practically unlimited and of such a nature that the state agency has almost absolute control over the life or death of motor transportation within its jurisdiction. Nevertheless, all of the rulings of the various commissions are subject to review by the proper courts.

In a few states, as New Hampshire, it is only necessary for the operator to obtain a permit from the state authority. This is the rare exception, how-In nearly every other state a certificate of public convenience and necessity is required, while in Colorado, New York and Wisconsin a permit from the governing bodies of the municipalitles in which the common carriers seek to operate must also be secured.

ARGUMENTS PRO AND CON

Those who contend for state regulation say that such control is necessary:

I. Because motor transportation for hire is a public utility and as such should be regulated along with other public vehicles so that travelers and shippers by such menns can be made

sure of safe, prompt, regular, adequate, efficient and economical service.

- 2. So that, in all cases where motor vehicle common carriers come or are likely to come, in ruinous competition with other common carriers, the state can step in and determine whether public convenience and necessity require such competition, and save, if desirable, the pre-existing agencies of transportation.
- 3. In order to shoulder upon the motor vehicle common carrier obligations, financial and otherwise, in return for the rights given it to operate for a profit over all or certain highways within a state, especially so since the highways are built and maintained by the public. In some cases these rights take the form of valuable franchises which virtually grant monopolistic privileges over certain routes.
- 4. For the purpose of eliminating the irresponsible, so-called "fly-by-night" companies and individuals who, while undergoing certain destruction for themselves, pull down with the ruin well managed motor transportation agencies which render a real public service and are entitled to a reasonable return on their investments and a stabilization of their business.

Opponents of state regulation of the motor vehicle common carrier, on the other hand, maintain:

1. That granted motor transportation for hire is a public utility, public interest can best be served by unrestricted competition and complete freedom from regulation in which none but the fittest can survive. This policy, they contend, will yield to passengers and shippers the maximum of results with the minimum of cost.

They deny any analogy between motor vehicle common carriers and railroad and trolley transportation agencies, pointing out that the latter by virtue of private ownership of franchises, rights-of-way, roadbeds, tracks and terminals have an exclusive and monopolistic control over all transportation on their routes. Motor truck operators, on the other hand, even where granted a monopoly of transportation for hire over a certain prescribed highway or portion thereof, cannot deny the use of that highway to others who wish for themselves or as private carriers to transport persons or property over those same routes.

Finally, they point out that governmental regulation of rail and trolley common carriers came after these agencies had abused their rights and through pools, stiffing of competition, exorbitant increase of rates, discrimination, stock watering, etc., made it necessary for the public in self-protection to subject them to control. the very nature of the service these evils are impossible with motor transportation since the road is free to the use of every one and motor vehicles are quickly, cheaply and in unlimited numbers available for every onc.

2. Since the obvious outcome of the first argument is "cut-throat" competi-

^{*}Abstract of paper presented at midyear meeting of New York Electric Ballway Association, New York, Jan. 25, 1923.

tion between various forms of transportation attempting to serve a certain territory, the opponents of state regulation do not attempt to ignore the logical consequences of such a struggle. They claim that wherever any existing form of transportation for hire cannot stand up before a newer and better form, public interest demands that it should give way; likewise, within that newer and better form of transformation, the rule should be survival of none but the most efficient and economical agencies.

Even though such a policy may mean the destruction at times of more or less invested capital, as it did when rail and inland water transportation first came into acute competition, they are confident that the final economic benefits to the community as a whole will many times compensate for the loss involved.

3. As for shouldering upon motor transportation for hire financial and other burdens which it should rightly carry, opponents of state regulation say that if the only questions involved are to determine the weight limits for motor vehicles used as common carriers, their registration fees and other charges, their liability to the public for injury to persons or damage to property, etc., these are not sufficient to warrant almost unlimited regulation in all other respects by a state agency.

4. Lastly, those against state regulation believe that the natural working out of economic laws will do more to stabilize the motor transportation for hire business than extensive interference on the part of governmental

agencies of any sort.

Position of the Conference COMMITTEE

After a thorough investigation of the experience which the various states have had with regulation of motor vehicle common carriers and after a canvas of the views of hundreds of interested parties, the Motor Vehicle Conference Committee, composed of representatives from the American Automobile Association, Motor & Accessory Manufacturers' Association, National Automobile Dealers' Association, National Automobile Chamber of Commerce and Rubber Association of America, has concluded that granted a state deems regulation of motor vehicle common carriers necessary, the following fundamental principles should underlie laws on the subject:

1. Control over interstate transportation of persons and property for hire, over regular routes or between fixed points, if adopted, should be exclusively in the hands of some agency of the state. No power whatever in the premises should be vested in the governing bodies of the municipalities of the state.

2. Such state control over motor vehicle common carriers should be placed in existing commissions, such as the public utility commission, etc., of the various states. It should be provided, however, that at least one member of such a commission should be conversant with and in sympathy with motor transportation.

3. As a prerequisite to the operation of a motor vehicle common carrier, the owner thereof should be obliged:

(a) To obtain a certificate of public convenience and necessity with a proviso that lines in actual operation before the law goes into effect shall prima facie be regarded as necessary to public convenience and necessity and should, therefore, automatically be granted a certificate.

(b) To take out liability insurance adequate to idemnify injuries to persons or damage to property resulting

from negligent operation.

4. The state regulatory bodies having control over motor vehicle common carriers should be vested with the same powers they exercise in controlling other forms of public utilities.

5. Any special or extra fees levied upon motor vehicle common carriers should be utilized exclusively for highway maintenance. Such special or extra fees should in no case be more than 100 per cent greater than the normal registration fees for the vehicles of the class to which they belong.

6. Legislation should be enacted enabling steam railroads, trolleys and shipping companies to acquire, own and operate the motor vehicle in conjunction with their regular line of business.

Reliability and Cost of Catenary **Insulators***

Among the Subjects Discussed Are the Relation Between Working Load and Cost of Insulator, Effect of Depreciation and Comparison of Different Insulator Types for Different Estimated Cost of Interruption

> By ARTHUR O. AUSTIN Chief Engineer Ohio Insulator Company

THE catenary line insulator is subiected to mechanical loads and electrical stress due to the normal voltage, as well as to surges due to switching or sudden changes in the current flowing in the system, and to lightning. When we look at the simple catenary system using a single bracket arm, the problem looks very simple, but when we look at the large trunk system with a number of tracks the problem is decidedly complicated. The small singletrack road with its light stresses, wood poles and relatively few insulators is unquestionably a better hazard than the large trunk system with its high mechanical stresses, steel structures and many insulators.

Fortunately, conditions are not as bad as they seem, for the reliability of the insulation is simply a matter of cost. Since cost is a controlling factor in producing reliability it is interesting to see in what manner the properties of the catenary system affect the cost of the insulator.

For direct-current systems the insulation is comparatively simple from the standpoint of the insulator, although line surges due to interruptions of the current may be relatively higher in a long line for direct current than for alternating current.

In so far as the main messenger insulators are concerned, it matters little whether insulators on adjacent messengers are operating on the same or on different phases, or with one positive and the other negative, with the full voltage to the track or ground on each. This arrangement, however, requires a material increase in the insulation be-

*Abstract of paper presented at the midyear meeting of the New York Electric Railway Association, New York, Jan. 25, tween the contact systems at other points than at the supports.

Since the amount of power which may be transmitted over a conductor with a given percentage loss increases as the square of the voltage, there is material saving in conductors and supporting structures by going to higher voltages. Higher voltages reduce the difficulty of current collection, which is a difficult problem where high speeds or large amounts of power are needed. The reduction in current at the higher voltages is also a material factor in reducing inductive interference with signal lines.

Where the suspension type of a series of strain insulators is used, higher voltages simply necessitate an increase in the number of sections in the insulator. Where the messenger runs over the top of a rigid insulator, increased voltages are handled very readily unless the mechanical loads are exceedingly high. Where the messenger is supported underneath a rigid insulator the problem is more difficult unless the mechanical loads are very light. The greatest difficulties with increased voltages are mechanical rather than electrical. This is particularly true where the suspension type of insulator is used, as the longer insulator required for the higher voltages permits a greater displacement of the contact wire during heavy winds.

While practically any degree of stability may be insured by the use of "V" strings or "steady" insulators, it is readily seen that these increase the operating hazard. (See Fig. 4.)

While increased voltages are desirable, it is recognized that the interchangeability of equipment tends to maintain voltages once established. In the a.c. system this is readily taken care of in the stepdown transformer. In the d.c. system the matter is not so simple when it is desired to operate equipment at a higher voltage, unless provisions have previously been made for such an arrangement.

As the general factors producing reliability are the same for the a.c. and for the d.c. system, the a.c. insulation will be discussed first, as the higher voltage used tends to show up the factors of cost and reliability to better advantage.

EFFECT OF MECHANICAL LOAD ON COST OF INSULATOR

Reference to Fig. 1 shows that as the maximum working loads increase, the cost of the insulator goes up very rapidly. The graphs are based on a factor of safety of three for the maximum load. A higher factor of safety is usually not advisable as the insulators may have a shorter life owing to higher thermal stresses either at the maximum or at the minimum temperatures. The difficulty of distributing the mechanical stress in the porcelain is also a factor where high ultimates are used. For this reason an insulator with a lower ultimate on test may have a higher effective reliability and permit a higher working load than an insulator of higher ultimate unless the latter is very carefully made.

If catenary lines are compared to transmission lines, it is well to bear in mind that the transmission voltage for an II-kv. catenary system would be $11,000 \times \sqrt{3} = 19,000 \text{ volts. This was}$ recognized in making up the curves in Fig. 1. In these curves the 11-kv. catenary insulator corresponds electrically to a transmission line insulator from 20-kv. to 30-kv. rating. In the same way, a 22-kv. catenary insulator corresponds to a line insulator having a rating of from 33 kv. to 44 kv. The large and more important system also requires insulators of a higher rating than the less important system, hence high mechanical loads tend to increase the cost of the insulator for electrical reasons as well as for mechanical.

It is readily seen that for light mechanical loads the bridge or special pin-type insulator mounted over the supporting structures is much cheaper than the suspension or strain type of insulator. For the higher working loads the reverse, however, is true. This is due to the fact that where the rigid type of insulator is used, high bending moments are set up, making the design costly. The rigid type of insulator is usually six to eight times stronger in compression than for side pull, and from two to three times as strong in tension.

Where a triangular catenary is used, it is possible to take advantage of the above, permitting the use of an insulator of moderate mechanical strength for high working loads, by inclining the axis of the insulator in the line of the resultant load. In addition to inclining the axis of the insulator, the grip on the messenger must be limited for longitudinal loads occasioned by a break in the messenger. This

same construction may be adopted for curves. To allow the insulator to take the line of the resultant is also a distinct advantage in most of the rigid insulators where the messenger is supported from the under side of the insulator.

It naturally follows that for high electrical reliability the catenary system should be as light as possible. This is also desirable in order to keep down the cost of insulation. This matter should receive careful consideration, as an increase in the weight of one item usually entails an additional expense for others, making it very easy to increase the working tensions and cost for a system without improving the reliability.

As catenary systems using large messengers and contact wires have a more stable contact system, there will be a strong incentive to use heavy construction where the traffic is dense. Fortunately, practically any degree of reliability may be obtained in so far as the insulator is concerned if sufficient clearance is provided. If the straight suspension will not give sufficient mechanical stability, "V" strings may be used and a sufficiently high electrical reliability obtained by adding more sections.

More trouble has been occasioned in the design of catenary insulators owing to limitations as to clearance than to any other one cause, and it is well to decide on the system of insulation before any decision is reached as to the type of structure. A good rule to follow in laying out catenary lines is to decide on the insulators first and then settle the other details as to type and size of supporting structure.

INSULATOR DEPRECIATION

It is not possible to cover this matter completely, but it is well to take into account the effect of depreciation on the reliability or operation of the system. This is particularly true where combined electrical and steam operation is necessary, for the heating from steam locomotives sets up very severe stresses in the insulator which tend to increase the rate of depreciation. There is also a sudden heating of the insulator due to the leakage of current over the surface when a locomotive blast strikes the insulator. Condensation from the hot moist blast striking the insulator is particularly severe where the insulator is below the supporting structure in main-line work or to one side in tunnels.

Complete electrification of steam roads will do much to improve conditions for the insulator and cut down the depreciation and resulting trouble, or to permit the use of smaller insulators.

Where steam locomotives are operated under catenary lines, the insulators are not only subjected to severe conditions due to the hot blast of the locomotives, but the surfaces are severely coated, necessitating more insulation than would otherwise be necessary.

Curves E and F in Fig. 2 show the lowering of operating costs which may be effected on an old system by the change in type of insulation permitted by increased clearance. This study also shows the marked advantage in lowering the operating cost, due to going over the system and weeding out faulty material wherever possible. In this connection, it is well to bear in mind that any two-piece insulator or twosection insulator may be tested out without disconnecting it from the line. This is a very important point to be taken into consideration in insulating even a low voltage system.

In two-part insulators the depreciation is likely to be more in one part than in the other. This applies to pin types, pendent or auspension insulators. Providing a single part of the insulator is large enough to carry the entire load and the other part should fail, the reliability will be very much higher if a given per cent depreciation based on a total number of parts is largely confined to one part of the insulator.

In Fig. 3 the total annual cost for different sized insulators is compared. It is readily seen that if the depreciation is exceedingly small a material saving may be effected. It is for this reason that many improvements have been added to the suspension insulator within the last few years in order to secure a low rate of depreciation. These improvements have necessitated an increased manufacturing cost, but this is made up a number of times, as a fewer number of sectiona may be used so that the final cost per thousand strings is very much less for a given standard of operation.

In deciding upon an insulating system, it is very important that the relative hazards of the different systems be given careful consideration, as this affects the annual cost of the interruptions very materially. In Fig. 4, several different insulating systems are compared with the same basis of depreciation. A study of this figure indicates the possible advantage of single insulating systems as against multiple systems where the same rate of depreciation obtains.

Fortunately improvements added to the insulators within the last two or three years make it possible to produce high ultimate strings with a low depreciation rate. This is a distinct advantage, as in the past insulators having a high mechanical ultimate have had a much higher depreciation rate. It is advisable to use a high ultimate insulator so as to take advantage of the lower hazard due to the single string as against the multiple string only where the insulators are of the most refined design.

RELIABILITY AS AFFECTING COST

The value of reliability is really the determining factor in the selection of the insulator system. The cost of interruptions varies, depending upon the importance of the system or the service desired.

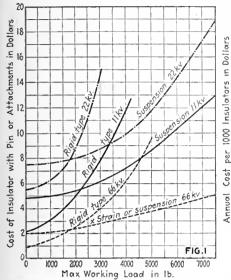


Fig. 1-Relation between working load and cost of insulator,

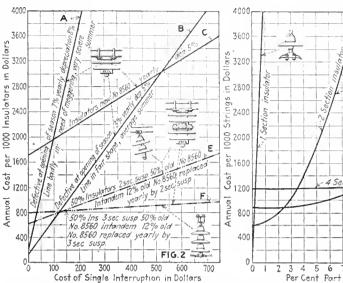


Fig. 2—Annual expenditure required for different insulators and combinations affected by average cost of interruptions.

800
400
1201
4 Section insulator

800
1202
4 Section insulator

FIG. 3
Per Cent Port of Depraciation

Fig. 3 Section insulators

Fig. 3 Section insulators

Per Cent Port of Depraciation on the annual cost of Various section in annual cost.

Fig. 3—Effect of depreciation on the annual cost of various sizes of insulators. Fixed charges, 30 cents per section; average cost of interruptions, \$500.

Where the value of reliability is slight it is a mistake to over-insulate the system, as the fixed charges for insulators and supporting system would be out of all proportion to the saving effected by reducing the probable number of interruptions. Where the system is large it is simply a matter of good business to capitalize the interruptions on a proper basis and balance this against the fixed charges. Fig. 5 shows the annual cost for one thousand insulator strings, for various average interruption costs.

While the information in Fig. 6 may be obtained from Fig. 5, the relation between the number of sections and the annual cost is shown to better advantage in Fig. 6.

By referring to Fig. 5 or to Fig. 6, it is seen that a three-section insulator is the most economical where the cost of an average interruption does not exceed \$275. It is further evident that there is little saving in the operating cost for a three section insulator until the cost of an interruption exceeds \$500. Even where an interruption costs only \$50, it is seen that a three section insulator costs approximately the same as a two section. Interruption costs would have to exceed \$2,000 to necessitate more than four sections in the string.

The conditions assumed in these studies are not based on the line in good condition, but under conditions which may prevail after some years of operation, or where they are severe.

The rates of depreciation are probably on the safe side, but in the past considerable expense has been incurred by not allowing sufficiently for this factor. In setting the rate of depreciation it must be remembered that the fragile dielectric in the insulator works under a factor of safety smaller than any part of the system. This factor of safety is largely independent of the working load applied, and seldom exceeds 2 or 3.

If reference is made to the several studies, it will be seen that insurance costs but little if any more and may safeguard an investment running into millions.

The same general rules apply whether the system is a.c. or d.c. The

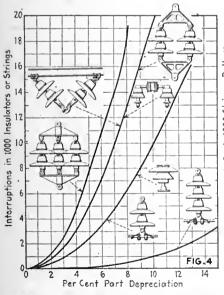


Fig. 4—Comparative reliability or hazard for different insulating systems. Interruptions based on probability of matching up of faulty parts in same insulator with 5 per ceut part depreciation.

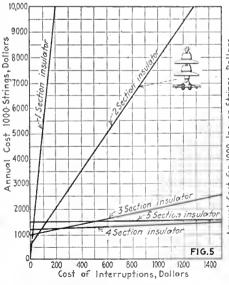


Fig. 5—Annual cost of 1, 2, 3, 4 and 5section insulators for different interruption costs. Fixed annual charges, 30 cents per section; nunual part depreciation, 5 per cent; accumulated part depreciation, 15 per

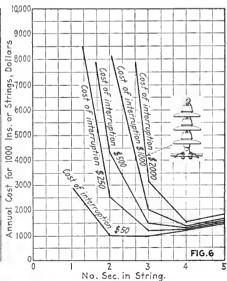


Fig. 6—Total annual cost including fixed charges and probable cost of trouble due to depreciation for different number of sections in insulator, and for different interruption costs. Fixed charges, 30 cents per section; annual part depreciation, 5 per cent; accumulated part depreciation, 15 per cent.

size and type of insulator, however, might be materially different.

RELIABILITY OF TRANSMISSION AND DISTRIBUTION SYSTEM

The reliability of the transmission and distribution system is of even more importance than that of the catenary system.

While a train may coast through a defective section on the catenary system, a complete shutdown results if the main transmission line or distribution system fails. Fortunately, the reliability of the transmission system is much more readily controlled than that of the catenary system. Not only is the hazard very much less, due to fewer insulator strings and supporting structures involved, but in addition, the high voltage system is practically free from lightning and bird trouble.

While it is true that some of the large trunk systems have been subjected to spill-overs under comparatively mild conditions, I believe that there is little question but that these spill-overs may be eliminated by applying our present knowledge of the art.

In studying the trunk or superpower line, it is well to bear in mind that the stored energy increases as the square of the voltage and that this energy feeding into an arc may cause a flashover of the system at a relatively low voltage. While this condition has been quite serious on some large transmission systems, practically no provision has been made to prevent it. Too much attention has been paid to the wet and dry flashover of the large insulator strings at normal frequency and not enough to the possibility of the stored energy feeding into an arc started by a transient.

Fortunately, a system has been developed which makes it possible to prevent an arc forming at the insulator or in the vicinity of the tower under conditions which will cause an arc to strike from the conductor 15 or 20 ft. out on the span. Where conditions of this kind are set up, it is apparent that we need have no concern for the insulator. This matter was treated in a discussion before the N.E.L.A. convention at Chicago in 1921 and in a paper before the International Congress at Paris in 1920.

In this connection it might be well to say something in connection with the frequency. For the very long lines, it is apparent that harmonics are much more likely to develop resonance with a high frequency than with a low frequency. If a high normal frequency for the transmission line is used, it is well to bear in mind that more preeautions will have to be taken to insure a good wave form and the absence of disturbances, as these may cause the line to are to ground, through no fault of the insulator, at 60 cycles, where there would be little or no trouble at 25 cycles.

The control system which has been developed for use on extremely high voltage lines is applicable to catenary lines in order to prevent spill-overs

due to lightning or to other transients, and it is possible that old systems which lack clearance, or systems which are having trouble from spill-overs may be materially changed by use of the control system or eaged conductor. Regardless of any difficulties which may have appeared in the past, it is certain that catenary and main-line transmission insulation is on a basis that will permit the highest degree of reliability at a comparatively low cost.

Many Speakers at Indianapolis Utility Meetings

Testimony Was General that State Commission Regulation Is Better than Municipal Regulation or Municipal Ownership of Utilities—Addresses Were from Public Officials, Utility Men and Industrial Leaders

THE folly of public ownership of utilities, care on the part of utilities in rushing into Federal Court under the provisions of the Fourteenth Amendment in appealing from decisions of public service commissions, closer co-operation between utilities and the public, the labor situation and many other matters of peculiar interest to public utilities were discussed at the third annual meeting of the Indiana Public Utility Association, held in Indianapolis on Jan. 25.

The meeting began with a closed session in the morning, at which a general discussion of the report of the committee on public utility information was had and officers elected. The public information committee reviewed the work done during the past year and showed by a mass of documentary evidence in the shape of clippings from virtually every paper in Indiana the value of getting the utilities' viewpoint presented properly before the public.

C. L. Henry, president Indianapolis & Cineinnati Traction Company, was re-elected president. Others elected were as follows: S. E. Mulholland, vice-president Northern Indiana Gas & Electric Company, vice-president; F. J. Haas, vice-president Southern Indiana Gas & Electric Company, vice-president; Marshall V. Robb, secretary Wabash Valley Electric Company, secretary, and Charles C. Perry, president Indianapolis Light & Heat Company, treasurer.

At a noon luncheon Taylor Groninger, corporation counsel of Indianapolis, and Gov. Warren T. McCray of Indiana gave addresses. Mr. Groninger not so long ago was one of the leaders, under the supervision of Mayor Lew Shank, in seeking legislation to abolish the Indiana Public Service Commission. In his address he commended the work of the Public Service Commission, but he also warned utility interests against rushing into Federal Court in rate case appeals before making their appeal to the state courts. He held that state machinery should be used before resorting to the United States courts. "There should be no antagonism whetever between the public and the public utilities," he said. "Public utility property is given over and devoted to the service of the public. Many safeguards have been thrown about it which make investments secure, and the service has been made efficient. A still closer relationship may be fostered if the operators will be more frank with the people and be content with a fair return on the reasonable value of their properties."

Governor McCray in a brief talk declared that he was for the public service commission law and would do all in his power during this and subsequent legislatures to prevent any amendments to the law which will in any way curtail the effectiveness of the work of the commission. He said there was no doubt that the majority of the citizenship of the state wants the commission and is, in the main, satisfied with its work.

By a coincidence Senate Bill No. 35, which provided that all utilities valuations for rate-making purposes should be based on the amount of assessed valuation on the tax duplicates, was postponed indefinitely on the day of the convention.

James P. Goodrich, president National City Bank of Indianapolis and formerly Governor of the state, thought that not one in ten citizens wanted the public service commission abolished. He saw some elements of danger in the large consolidations such as are now being perfected. He also saw a danger in too frequent appeals to the Federal Courts. On this point he said: "There is a savor of public ownership element which might grow out of too many of these appeals, and we all know what we think of public ownership. This court should be used as a case of last resort."

B. J. Mullaney, director of the committee of public utility information of Chicago, gave a talk on the experiences of utilities in Illinois with commission regulation. He traced the law from its inception to the present time, through three state administrations, and declared it was very easy to mistake noise for numbers in agitation against a public service commission. The feature of this talk was the fact he brought out that in Illinois, under the latest provisions of the law, it is possible for any city to vote itself out from under the workings of the law hy popular vote and go back to the "home rule" system. In spite of agitation against state regulation, not a city in the state has done this yet, though they have had ample opportunity.

G. B. Maxwell, former secretary of

the Ohio Public Service Commission, said the public should understand the necessity for new capital for extensions of service and of the problems of utility companies, particularly in the matter of taxation. He told of the troubles of those utilities in Ohio which were not under the public service commission.

TALKS ON DIFFERENT UTILITIES

Short talks then followed on experiences of the different classes of utilities. Arthur W. Brady, Anderson, spoke for the interurbans; Howard Dill, Richmond, for the water companies; T. E. Bohn, Fort Wayne, for the telephone interests; S. E. Mulholland, Fort Wayne, for the gas companies and Harry Reid, Indianapolis, for the power and light interests.

MR. HURLEY SPEAKS ON PUBLIC OWNERSHIP

At the banquet in the evening, customer ownership and not government ownership was urged as the real remedy for economic ills by Edward N. Hurley of Chicago, former chairman of the United States Shipping Board. He said in part:

"The federal government's venture into the field of public management of industrial and public service enterprises demonstrated conclusively that not more than 50 per cent personal efficiency can be obtained under such management. I speak advisedly and out of full and intimate knowledge of the facts, and I do not hesitate to add that this average of 50 per cent gradually decreases the longer the individual manager or the individual employee continues in industrial service under public management. It narrows down to this: Do we get as good service in the city hall as we do in a department store? How long would a department store stay in business with city hall service?

"One indictment that has been made of the American business man is that he neglects public duties. The farmer is quick to put forward every effort to improve his condition. Labor exerts itself to heal its wounds and strengthen its position both with the public and governmental authorities. The business and industrial executive, however, is prone to concentrate upon his business to the exclusion of other things. It results too frequently that he is called on the defensive in legislative matters where there is no need or reason for him to be on the defensive. Many business men do not know the names of their representatives in their state legislatures. What can we expect from men when we display such indifference toward them and their policies?

"Refuse to be on the defensive when you are not really called upon to occupy such a position. Drive home the fact that whereas the public utility owes an obligation to the public, there is an equivalent obligation which the public owes to the public utility company."

The Authority, Duties and Responsibilities of the Safety Chairman*

This Official, the Author Believes, Will Come Gradually to Replace the Claim Agent—An Efficient Accident-Prevention Plan
Should Involve Every Person Connected with the Electric Railway Organization

BY NEIL W. FUNK
Director of Safety Louisville Railway

THE principles of safety and of accident prevention have probably developed faster during the past few years than any other ideas in the community. The peace-time call to make travel through our streets and work in our industrial plants safe has been responded to with enthusiasm by the street railway industry. As progress is made in the direction of reducing accidents, the work of the safety department will gradually come to replace that of the claim department. The claim agent will become the safety chairman or director of safety.

The director of safety has "arrived" in the electric railway industry. His primary duty is to organize the rank and file of the company's men along safety lines. This can best be done by having a complete safety unit in every department.

Our policy is to have the men elect their own safety committee men through their welfare association. Three men thus elected select one of their own number as chairman. This unit is supreme in authority as to safety matters in the particular department where it functions. Our idea has been to have from every carhouse, as members of these units, one motorman, one conductor and one motor inspector. This gives co-ordination along safety lines of the mechanical and operating branches. We also have units consisting each of the same number of men from other departments, such as power house, construction department, car shops, etc.

The chairmen of these units should be called together by the safety chairman at least once a month for conference and discussion. This gives an opportunity for the safety chairman to explain the elementary principles of street railway law, which is important because many a man violates the law unwittingly. Little should be heard from the safety chairman after the first meeting, as the chairmen of the units will have suggestions which they are anxious to make and hear discussed.

During two years we have received about 500 suggestions along safety lines, of which probably 425 were useful and practical. It is the duty of the safety chairman to secure action by the company on every possible suggestion made by safety committeemen. Our entire safety organization is changed every three months, so that in time

THE principles of safety and of every employee will have had a three accident prevention have probably months course in safety in one of the reloped faster during the past few safety units.

The safety chairman in our organization accompanies an inspection committee once a month on a tour of the company's property. This committee comprises one motorman, one trackman, one wireman, etc., until we have every division of labor in the company's organization represented. The results of this work have been very satisfactory.

The safety chairman should never become involved in matters of discipline. He should not have the authority either to employ or discharge men. The chairman should, however, have an opportunity to talk to every new platform man employed, and he should know personally every member of the company's organization from the president to the car cleaner. He should know the men well enough so that each considers him a friend.

It has been said that eternal vigilance is the price of liberty; at the same time it is the price of safety. Ordinarily men are not careless, but the work of a platform man in time becomes somewhat monotonous and he is apt to become careless. Our experience is that the older men cost us more money in the way of settling accident claims than the new ones. This occurs because the new man has more confidence in safety appliances than in his own ability, while the reverse is true with the older men. This shows that safety is largely a question of constant suggestion as to the possibility of accident. No safety bulletin should be issued without the approval of the safety department, and such bulletins should be designed by a member of the company organization in order to secure attention.

The safety chairman should be ready to aid all public safety movements in his community outside of his own organization. It should be his duty to support the National Safety Council, which necessarily is of more help in the electric railway industry than in other industries.

In conclusion I wish to mention an important safety development in Louisville, known as the "Life Savers' Club," which is sponsored by the Courier-Journal and the Times. Every motorman and truck driver who operates for a year without an accident is awarded membership in this club, with a button to indicate such membership. Such recognition furnishes a strong incentive to carefulness.

^{*}Abstract of an address before the annual meeting of Central Electric Rallway Association, Louisville, Ky., Jan. 18 and 19, 1923.

International Engineering Congress Plans for 1926

PLANS for an International Engineering Congress to be held at the time of the sesquicentennial celebration in Philadelphia are well under way and were reviewed at a meeting held under the auspices of the committee on plan and scope in New York City on Jan. 9. At the meeting the following topics were discussed: Scope of the congress, finance, relation of meetings of engineering societies to the sessions of such a congress and publicity. The board of management for the congress has been organized, with temporary officers and with representation from the American Society of Civil Engineers, the American Institute of Mining & Metallurgical Engineers, the American Society of Mechanical En-

gineers, the American Institute of Electrical Engineers, the Federated American Engineering Societies and the Engineers' Club of Philadelphia.

New England Street Railway Club Will Meet in February

THE February meeting of the New THE February meeting of the Will England Street Railway Club will Rose be held at the Copley Plaza Hotel, Boston, Feb. 8. At the afternoon meeting George E. Pellissier, assistant general manager of the Holyoke (Mass.) Street Railway, will read a paper on "Cooperation." The evening meeting will be addressed by Wallace B. Donham, Dean of Harvard School of Business Administration. Mr. Donham was at one time receiver of the Bay State Street Railway.

American Association News

Further Midyear Program

CCEPTANCES have been received A CCEPTANCES have been seen by Secretary Welsh from the following men to discuss the principal addresses at the midyear meeting in Washington, on Feb. 16. The morning address on "Regulation" by the Hon. Dwight N. Lewis will be discussed by Henry L. Doherty, Col. Charles Keller, chairman District of Columbia commission, and C. E. Elwell, member of the Connecticut commission.

The address in the afternoon on

"Taxation" by Senator F. N. Davenport will be discussed by Alexander Forward, member of the Virginia commission, and Alfred T. Davidson, general counsel Third Avenue Railway, New York.

At the evening banquet, in addition to the Hon. Albert Bacon Fall and former Vice-President Thomas Riley Marshall, who have already been announced as speakers, President C. E. Emmons will make an introductory address in which he will discuss the fundamental conditions in the industry, and there will also be an address by Thomas N. McCarter, president Public Service Railway.

Way Committee Holds Two-Day Session

MEETING of the way committee of A the American Electric Railway Engineering Association was held at association headquarters, New York on Jan. 25 and 26. The following members were present: W. F. Graves, chairman, Montreal, Canada; H. H. George, vice-chairman, Newark, N. J.; R. C. Cram, sponsor, Brooklyn, N. Y.; C. A. Alden, Steelton, Pa.; V. Angerer, Easton, Pa.; S. Clay Baker, East St. Louis, Ill.; E. B. Entwisle, Johnstown, Pa.; R. B. Fisher, Harvey, Ill.; Charles F. Gailor, New York, N. Y.; J. H. Haylow, Memphis, Tenn.; E. M. T. Ryder, New York, N. Y.; A. T. Spencer, Toronto, Canada; Francis Tingley, Washington, D. C., and W. W. Wysor, Paltimore, Md. S. G. Hughes attended in place of H. Fort Flowers, and H. F. Hile of the Wharton Company was also present.

Mr. Alden, chairman of the sub-committee on subject No. 1, which is making a study of the standardization of frogs and car clearance easements, gave a general outline of the status of the subject and also presented some conclusions of the committee regarding this. An elaborate method for materially reducing the number of standard frogs required in the various layouts was presented. The plan was discussed very generally and suggestions for modification were offered.

Mr. Baker, chairman of the sub-committee in charge of subject No. 2, which is studying design of substitute ties, outlined the problems confronting the committee. The subject was discussed in detail and it was agreed that the subcommittee should proceed to establish in detail the desired and practical features of a substitute tie and then, if possible, determine how nearly the present substitute ties met these requirements.

Mr. Haylow, chairman of the subcommittee in charge of subject No. 3, which is appointed to co-operate with the committee on buildings and structures on the design of small bridges, culverts and trestles, reported results of a meeting with the committee on buildings and structures held at association headquarters on Jan. 24. The committee will continue its work in developing the subject suggested.

Mr. George, chairman of sub-committee No. 4, which is pursuing a study of the design of track construction for paved streets, presented a set of specifications for consideration. These were discussed in considerable detail and a large number of corrections were decided upon.

Mr. Wysor reported on Subject No. 5, which includes an investigation of all

forms of welded rail joints and described in detail the design of the proposed rotary testing machine which is being considered by the committee on welded rail joints. This committee will keep in touch with the welded rail joints committee with the idea of assisting and making any suggestions possible.

In connection with Subject No. 6. which consists of a review of existing standards and recommendations for presentation to the American Engineering Standards Committee, C. W. Squier, representative of the association on the sectional committee dealing with the standardization of bolts, nuts and rivets. reported as to the work which was being accomplished in connection with the standardization of track bolts. A print showing the average dimensions of bolts which were obtained from a study of the track bolts being used on a number of representative electric railways was presented to each member of the committee and their criticism was requested.

Mr. Entwisle, chairman of the committee on subject No. 7, which was appointed to revise the specifications for manganese steel switch pieces, reported on the work already undertaken and it was decided to give the matter further study. A further report will be made at the next meeting.

Merchandising Transportation

PLANS for the work for the ensuing year of the T. & T. committee on merchandising of transportation were outlined at a meeting of the committee with Chairman Samuel Riddle in Louisville on Jan. 19. Those present besides the chairman were W. H. Boyce, sponsor; F. L. Butler, J. A. Dewhurst, F. D. Norveil, G. S. Brush, C. L. Van Auken and Labert St. Clair.

It was decided to centralize the committee's study on the weekly pass. methods of increasing the freight business and business producing display advertising through newspapers, window signs and other mediums. A special study of increasing interurban business will be made. Sub-committees are to be announced within the next few days by the chairman.

Stores Accounting

T a meeting of the Accountants' A Association committee on stores accounting, held in New York City on Jan. 23, it was decided to make a study of inventories in co-operation with the committee on purchases and stores, of which B. J. Yungbluth is chairman. After discussion of the joint committee report on stores accounting, presented and discussed at the 1921 convention. it was concluded that the recommendation made then, that the formulated materials classification should adopted as standard practice, should probably be reaffirmed this year.

The New York meeting was attended by R. A. Weston, the Connecticut Company, New Haven, chairman; C. L. Bartlett, Haverhill, Mass., and A. E.

Hatton, Pittsburgh, Pa.

Maintenance of Equipment

Rearranging Wheel and Axle Shop for Lower Cost and Higher Production

BY H. E. HOCHETTE Third Avenue Railway, New York, N. Y.

GENERAL rearrangement of the machinery in the Sixty-fifth Street shops of the Third Avenue Railway has recently been carried out, and along with this has come a complete revision of the facilities for handling wheel and axle repairs. As a result of the changes made, the production of pairs of wheels (drivers and ponies) necessary for supplying the material department and for delivery to the truck overhauling shop and various carhouses has been increased 50 per cent. This increase parallels a 20 per cent reduction in the cost per pair of wheels handled, and, further, the frequent peak demands which formerly caused no little difficulty can now be taken care of without effort.

In order to understand the demands made on the wheel and axle department of the Third Avenue Railway, a few of the essential requirements will be enumerated. The company operates 1,600 cars from eleven carhouses. Forty-six per cent of these cars operate over tracks with the underground conduit contact system. Forty-nine per cent use the overhead trolley contact system, and the remaining 5 per cent are storage-battery cars. General overhauling, reconstruction and all but minor repairs are done at the Sixty-fifth Street repair central shop, which simplifies the work to a great extent. On an average twentyfive pairs of steel driver wheels and fifty pairs of cast-iron pony wheels are handled by the wheel and axle department every day.

The men who carry on the work in the wheel and axle shop consist of one boring mill hand, who is also the inspector as well as the leader; one axle lathehand; one wheel lathehand; one wheel-press man, and a helper, who also handles the wheel grinder and general work. This makes a total of five men in the organization at the present time. Previous to the changes made in this department, there were a total of seven men required.

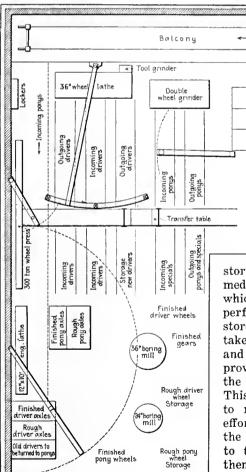
accompanying illustration The shows the layout of the tracks, the location of the various machines, and the cranes used for handling wheels and axles. The machine tools include one 300-ton wheel press, which has been recently overhauled, and in addition to some minor changes has been equipped with a new cylinder lining, which has increased the output of this considerably. Α hvdraulograph was attached to the press, so that a graphic record of every press made is now obtained and detailed studies of these records have furnished much interesting and valuable information. Other machine tools, which were overhauled and relocated, included a 36-in. boring mill for steel driver wheels and gears, a 24-in. boring mill for cast-iron pony wheels, and a 12-in. x 10-ft. engine lathe for finishing and turning both driver and pony axles.

The 36-in, wheel lathe was given extensive overhauling, rather which included the providing of two new toolposts as well as parts for the old ones, which are now held in reserve. The overhauling and purchase of these new toolposts have provided a very efficient machine and have resulted in increased production and lower unit cost. In addition to this equipment one double-wheel grinding machine was overhauled and the power transmission rigging was greatly improved. A new exhaust system has also been installed.

Previous experience showed that it was advisable to provide for the

Truck shop ---

Machine Shop



Sketch of Rearranged Wheel and Axle Shop, Third Avenue Rallway

storage of rough material in the immediate vicinity of the tools upon which the operations were to beperformed rather than in a separate storeroom. This detail has been taken care of in the rearrangement. and ample storage space has been provided for both the finished and the rough material except gears. This storage space is located so as to require a minimum amount of effort to deliver the various parts to the machine tools for finishing or to the wheel press for assembling them.

Special attention was given to provisions for speedy routing of the parts through the shop. The accom-

panying layout of the tracks shows the orderly and compact arrangement provided for the assembled units. A transfer table was installed for handling the work to and from the various tracks, and cranes have been located so as to serve all machines and to handle the material in an efficient manner. The wheels and axles are received in this department, either from carhouse supply cars which run into the shop on a balcony, as shown in the accompanying layout, or from the truck overhauling shop, which is adjacent to the wheel shop. Both of these sources are served, along with other departments, by an overhead traveling crane, which delivers drivers and ponies to their respective incoming tracks. After inspection the units are routed in three ways. First to the wheel press for dismounting, if any part is to be scrapped or should the axle need to be turned; second to the wheel grinder, and third to the wheel lathe for turning to gage.

The wheel press is served from the floor by the transfer table and by a 1-ton piston air hoist trolley, which is mounted on a 10-ft. jib crane. A study of the layout will show how the dismounted material is disposed of and how the supply of new material is handled. After the units have been newly assembled, they are routed either direct to the wheel lathe or grinder if work by these tools is required, or to the outgoing tracks for inspection.

The wheel lathe is served by a 1-ton electric hoist trolley mounted on a 22-ft. radial roller crane as shown in the illustration. The wheel grinder is served by a 1-ton piston air hoist trolley mounted on a 10-ft. jib crane. Finished units from either of these two machines are shifted by hand to their proper location for inspection. A 20-ft. jib crane equipped with a 1-ton chain hoist trolley takes care of the axle lathe, while the boring mills are served by a built-in jib crane.

This rearrangement and overhauling of machinery and the provision of the labor-saving devices for handling have not only increased the production and lowered costs to a marked degree, but have also enabled the making of inspections in a more orderly manner, and to visualize the reserve stock of units more easily at any time of the day. A further result of the change is the effect it has had in helping to obtain maximum advantage from the piecework system which is now employed.



The Teneks Line Up Behind the Loader and Are Backed Info Posiling for Receiving Their Loads

Railway Company's Snow Loader Helps Dig Out Boston Streets

TWO snow-loading machines purchased by the Boston Elevated Railway are being given almost continuous service due to the large snowfall which has occurred during January in the New England district. These machines were purchased from the Barber-Greene Company, Aurora, Ill., and the first was put in operation on Wednesday, Jan. 3, and it continued in service without any overhauling up to Sunday night of that week. Crews were broken in so as to keep the machine working continuously. The second machine was brought into the Huntington Avenue grounds on Wednesday afternoon, Jan. 10, and was unloaded and working on the street at 8:45 p.m. It is thus evident that no time was lost in getting the machine into service.

Accompanying illustrations show

the machine in operation. It can load trucks faster than they can take the snow away. As compared with the use of flat cars and shovelers, tip carts and snow sleds, this machine has been able to do the work of 100 shovelers to each shift.

The snow loader is of the crawler traction type. It has full length continuous tread 58 in. long by 8 in. wide and can be fitted with non-slip cleats when extra traction is desired. The track is cast integral with the link and the chain and sprockets are protected. The truck frames are made of fabricated structural sections, the tread links of cast steel, and the carrying rollers of chilled cast iron.

The snow elevator consists of a rubber belt 32 in. wide, which has cross-angle flights or cleats every 20 in. Twelve-inch skirt boards are placed on either side of the elevator to help hold the snow and to gain an effective carrying width of 35 in. Two shaving plates of hardened steel



Scooping Up the Snow and Loading Into Truck

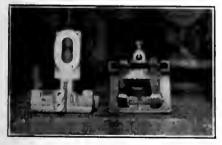
extend out on either side and ahead. These are placed immediately in front of the lower belt pulley and give a cleaning width of 6 ft. The whole arrangement has a quick acting up and down adjustment at the operator's platform. This adjustment is provided for passing any obstructions such as manhole covers or for setting the scraper to shave the surface clean. The machine is driven by a four-cylinder Buda gasoline engine and travels forward at a speed of 40 ft. per minute and has a reverse speed of 107 ft. per minute.

The operator has one lever for steering coupled to outside adjustable brake bands operating on brake drums which are located at each end of the differential shaft. By throwing the lever to the right the machine turns to the right. Forward and reverse motions are controlled by friction clutches connected to another lever. A third lever with a friction clutch operates the elevator belt.

A wheel controls the up and down adjustment of the snow plow for operating. Another lifts it to the traveling position. All are located within reach of the operator as he stands on the platform above one crawler. The machine has an overall length of 25 ft. 6 in., a plowing width of 6 ft. and a length of crawlers over all of 61 in. The maximum height of the machine is 12 ft. 4 in., and its approximate weight is 10.000 lb.

Interchangeable Brush-Holder Designed

THE number of motor failures from grounded brush-holders has been cut in two on the equipment of the Cleveland, Southwestern & Co-



Brush Holder with Center Lead Connection Makes Only One Type Necessary

lumbus Railway by the use of holders having the connection in the center instead of on the end. With the lead attached in this fashion the connection is removed about an inch further from the motor case and at

the same time the holder can be used for either the right or left-hand position. The interchangeable feature has reduced by one-half the number necessary to carry in stock. The original brush-holders, having lead connections on the end nearer the motor shell, could be used, of course, only in the intended location.

The new type of holder, which is used on the Westinghouse 93, 112 and 304 motors, is made in the Elyria shops of the company from brass castings. Only a few simple machining operations are required such as smoothing up the arm and drilling and tapping for the spring and motor lead screws.

New Equipment Available

Demountable Nose for Snow Removal

A QUICK demountable snow plow nose as an accessory to the Differential Car has recently been developed by the Differential Steel Car Company of Findlay, Ohio. It is

height of the heel. The contour of the plates forming the plow is of unusual interest. Geometrically, it is a double warped surface and its action is similar to that of the ordinary plow share. The shape of the plow gives to the snow a rolling motion, tracing a helix, laterally and



Snow Nose Applied to Car

made in both single-track and double-track types. This application is in line with the company's policy of combining as many features as practicable in the Differential Car to make it a general purpose equipment and at the same time to eliminate the possibility of the equipment remaining idle under any seasonal or climatic conditions.

The plow is readily applied to the car by making only three pin connections. It is raised or lowered by means of an air cylinder and its supports are so arranged that in raising or lowering the plow its action is similar to a pantograph in that the bottom edge of the plow remains always parallel to the track. In this way the height above the rail of the toe of the plow is the same as the

upward across the face of the

Some of the advantages claimed for this plow are that its cost is but a very small fraction of the cost of the ordinary snow plow, and due to the three pin connection construction it can be put on or taken off with little labor and with great speed. Its use on the Differential Car gives a propelling unit of sufficient weight for snow plow duty, hence there is no deterioration of motors due to standing unused for the greater part of the year.

The Differential Car itself is very useful in hauling the snow away and is particularly valuable in large cities where removing the snow from the streets is as imperative as its removal from the tracks.

The News of the Industry

Huge Terminal Project in Chicago

I'lan Evolved for Consolidating Three Terminals on Site of Old Dearborn Station

A new passenger terminal in Chicago, which would cover 50 acres and cost \$55,000,000, including electrification, has been planned to take the place of the old Dearborn Street station erected forty years ago and partly burned on Dec. 21 last. The scheme covers the development of all the area from Polk to Sixteenth Streets between State and Clark Streets. The designers assert that this not only would be sufficient for all of the seven roads using the old Dearborn Street station, but also would care for the New York Central and Rock Island lines, now housed in the La Salle Street station, and the Baltimore & Ohio, Père Marquette and other roads using the Harrison Street station.

The scheme outlined is one result of the study of the terminal problem in Chicago. The Illinois Central terminal plant is another. The New York Central lines have been making another plan and the roads using the Baltimore & Ohio terminal have also been studying and investigating. Each group is attempting to ascertain what are the maximum facilities and probable costs of a joint terminal on the area of each of the three present stations. Moreover, each group is attempting to convince railroads in the other groups that they should move to new quarters. The highly encouraging feature of the terminal situation is that all the groups concerned are studying the subject.

This plan proposed by the Dearborn station group would include the opening up of Dearborn Street as a two-level traffic route to the south, and it contemplates the development of the air rights as has been done at Grand Central in New York. This would increase property values tremendously to the south of Chicago's loop.

Co-operative Plan in Buffalo

Mitten Management Formally Adopts Philadelphia Ideas of Application on International Railway

Rapid progress is being made by the International Railway, Buffalo, N. Y., in the organization and development of the new International Railway Company's Co-operative Benefit Association. R. R. Ray, formerly with the Philadelphia (Pa.) Rapid Transit Company, is secretary of the association. The collective bargaining plan has also gone into effect. Former disciplinary measures were set aside on Dec. 31, 1922.

The new association is open to all platform and other employees of the International who have been in service thirty days or more. The membership benefits include life insurance of \$1,000 payable at death; sick benefits of \$1.50 a day for a maximum of 100 days, and a pension of \$40 a month. The dues are \$1 a month. Local units of the association have been formed in Buffalo, Niagara Falls and Lockport and the employees in various departments already had elected their representatives.

Herbert G. Tulley, president of the International, says that most of the trainmen employed by the company to take the places of the men who have been on strike since July 1, 1922, have become enrolled in the new organization and

there is now on foot a movement in the various departments to have 100 per cent membership.

As for the co-operative plan, a booklet has been issued describing its working under the Mitten management in Philadelphia. Under the Mitten plan in Buffalo, the basic maximum wage of 55 cents an hour has been fixed for one year from Dec. 31, 1922. Thereafter the basic maximum wage will be determined by a 50 per cent employer-employee committee with corresponding adjustments in all departments, consideration being given to cost of living and ability of company to pay. In all other respects the plan as applied to the International follows closely the lines of the plan in effect in Philadelphia.

New Texas Interurban Line Opened

Dallas-Terrell Line, Opened Jan. 14, Is 31.5 Miles Long and Cost \$2,000,000—Work of Building Completed in Less than
Twenty Months—Right-of-Way 100 Ft. Wide

THE Texas Interurban Railway, extending from Dallas, Tex., to Terrell, 30 miles east, was placed in operation on Jan. 14. The formal inspection tour was made on Jan. 13, when a special car bearing officials of the line, city officials of Dallaa, Terrell, Mesquite and Forney, towns touched by the line, and other invited guests made a trip from Dallas to Terrell and return. Cars leave Dallas at 6.15 a.m. and Terrell at 6.45 a.m. daily and thereafter hourly until 11.15 and 10.45 p.m. One hour and twenty minutes is required for the one-way trip.

The Dallas-Terrell Interurban line represents an investment of approximately \$2,000,000. The investment of this sum in an electric railway in the face of competition from buses, steam railways and automobiles is regarded as an outstanding mark of confidence in electric railway transportation.

At the time of the granting of the railway franchise in Dallas to the Dallas Railway, in 1917, the Electric Bond & Share Company, New York, and the United Electric Securities Company, Boston, joint owners of the Dallas Railway, agreed with the city of Dallas to build two interurban lines, each at least 30 miles long, from Dallas to points outside. Several extensions of time were granted on account of the war and inability to finance the lines on account of money stringency, but finally the Dallas-Terrell line was decided on as one of the two.

Construction was begun in March, 1921. A contract was previously entered into by the Texas Interurban Railway and the Texas Construction Company, under which the Texas Construction Company agreed to deliver to

the newly formed interurban company a completed electric line extending from Dallas to Terrel, 31.5 miles in length, together with all equipment ready for operation. The Texas Interurban Railway is the operating company.

In the organization of the Texas Construction Company, B. R. Brown was named chief engineer. He has had entire charge of all the engineering work in the construction of the Dallas-Terrell line. Sam R. Fowler was named general superintendent of the Texas Construction Company. He has had entire charge of all the construction work. Richard Meriwether, vice-president and general manager of the Dallas Railway, was also named vice-president and general manager of the Texas Construction Company. He has been in close touch with Chief Engineer Brown in supervising the design and construction of the new line. W. R. Burns, assistant secretary and treasurer of the Texas Construction Company, has had charge of all financial matters in connection with the building of the line. H. N. Clagett, Forney, and B. H. Hart, Mesquite, were named resident engineers, the residency of Mr. Hart extending from the Dallas County line to the city of Dallas and the residency of Mr. Clagett extending from the Dallas County line to the city of Terrell. B. F. Cook, electrical engineer, has had charge of the installation of the automatic substation equipment, while the overhead construction has been under the supervision of Frank Steger, general line foreman.

The operating personnel of the Texas Interurban Railway is composed of Richard Meriwether, vice-president and general manager; J. B. Walker, secretary and treasurer; M. B. Parsons, superintendent of maintenance and operation; L. W. Tate, assistant secretary and treasurer; R. L. McGregor, chief dispatcher, and Mr. Owens, dispatcher.

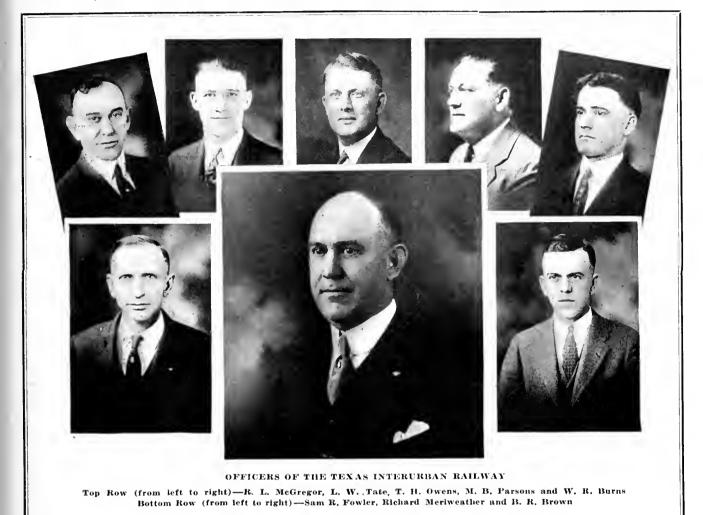
The Dallas-Terrell interurban passes through Mesquite, 12.1 miles east of Dallas, and Forney, 19.7 miles east of Dallas. Mesquite has a population of used. Other materials used in constructing the line aggregated 370 carloads.

There are 4,800 ft. of timber trestles and three steel span bridges on the line. The trestles consist of four treated pile bents, spaced 14 ft. center to center. Where creek beds are rock, concrete footings and 12x12 pine posts have been substituted for piling. Drainage has

of design were submitted by the Texas Construction Company. The cars are designed for operation by one or two men. They will be operated by one man except during the rush season.

There are seventeen stations along the line, exclusive of the handsome brick stations at Dallas, Terrell, Forney and Mesquite.

Two automatic substations have been



800 and Forney approximately 1,500. The density of population along the line is about 1,200 to the mile.

The country between Dallas and Terrell is fairly level, and the line has been built with a maximum grade of 3 per cent. The curvature is unusually light, there being one tangent of 12 miles between Forney and Terrell and at a point between Forney and Dallas a tangent of 6 miles.

Grading was begun in March, 1921, and track laying was started in June, 1922. The line was completed in twenty months. A total of 468,000 working hours, exclusive of grading, was required in the construction of the line, a force of 300 men being employed.

Although the territory traversed by the line is prairie, a total of 424,525 cu.yd. of dirt had to be removed in the construction of the roadbed, and after grading was finished 2,500 carloads of gravel ballast, 30 cu.yd. to the car, were

been well cared for, reinforced concrete pipe having been used in the construction of culverts. The right-of-way for the entire distance is 100 ft.

No expense has been spared to make the road safe in every way, and on the entire line there is but one main pipe crossing between Dallas and Terrell. An overhead crossing over the Texas & Pacific has been built just outside the city limits of Dallas at a cost of \$40,000.

The track over the entire line is in double-track position, 70-lb. A.S.C.E. rail laid to standard gage, with 6-in.x 8-in.x8-ft. oak ties spaced 2 ft. centers. Specifications for the double track call for gravel ballast with at least 6 in. of gravel under the ties. The overhead construction is of the standard span type, with creosoted 35-ft. pine poles, spaced 150 ft. apart.

Five passenger and two express cars were purchased. They were built by the American Car Company. Specifications installed, this being the first time the automatic substation has been used in this part of the country.

Electrification of Temiskaming & Northern Recommended

A report recommending the electrification of the Temiskaming & Northern Ontario Railway, which was prepared by S. B. Clement, chief engineer, and J. G. G. Kerry, consulting engineer, of the company, is now being considered by the Railway Commission and Premier Drury of the province of Ontario. The committee said:

We recommend electrification of the main line from North Bay to Cochrane (253.3 miles), and of the Iroquois Falls sub-division (7 miles) and Porcupine sub-division (33.1 miles), as providing a sound and self-supporting Investment for the capital funds of the province in a further developm at an upbuilding of Northern Ontario. We recommend that the commission take immediate steps to secure title and control of water powers on the Amable du Fond, Blanch and Frederick-House Rivers.

We recommend that after title to these water powers has been secured, opportunities should be given to the companies operating power plants in the district to tender on the supply of electric power for the commission. the commission.

In discussing the report, Chairman

Lee said:

The margin is so close between the cost of the present operations and that which would occur under electrification that there is some hesitation in proceeding immediately with the scheme. Its success will depend altogether on the volume of future traffic. The estimated cost of electrifying the line to give it a capacity to handle the expected 1925 traffic, calculated at 25 per cent greater than that handled in 1921, is \$11.214.778.

The Temiskaming & Northern Ontario commission, in presenting the report to the outario Government, recommended that electrification be postponed for the present, and was authorized by the Government to continue its investigations in the matter.

Toronto Spending Lavishly on Its Municipal Road

Under municipal ownership the city of Toronto, Ont., will have a local transportation service probably second to none anywhere in the world for a city of its size. It is a thorough job that the Toronto Transportation Commission is doing in re-building the lines of the Toronto Railway, but the costs are piling up. Even the Toronto Globe, a strong advocate of the idea of city ownership, has shown concern about the matter lately. The Globe expresses alarm at the expenditure of another couple of millions on carhouses. That paper continues:

paper continues:

Aiready sums totalling almost \$25,000,000 have been spent on reconstruction. The arbitrators who will determine the value of the system when taken over in september, 1921, have not yet given their award, but it is not likely to be less than \$10,000,000. The city's share of the cost of arbitration will be little short of a million. The civic car lines, built before 1921 and now incorporated in the Transporation Commission's system, cost \$2,750,600 and interest and sinking fund on them must now be met from street car fares. The total expenditure on which interest must be paid will be more than \$40,000,000 when payment is made for the old Toronto Railway and the shops now contracted for are completed.

Railway and the shops now contracted for are completed. In the civic estimates of 1922 the amount required for interest and sinking fund charges on the then street railway capital investment of \$29,481,000 was \$1,835,000. On \$40,000,000 it will be roughly, \$2,500,000 a year. The annual charges of the Toronto Railway before the stock ceased to pay dividends were slightly under \$1,200,000. The capital charges of the reconstructed road will be more than double those of the Toronto Railway.

Service-at-Cost in Milwaukee

Service-at-cost operation of the electric light and street-railway public utility properties of the Milwaukee Electric Railway & Light Company in Milwaukee and the ultimate purchase of the property by the city are provided for in a contract which the public utilities committee expects to present to the City Council within the next two weeks, according to Fred S. Hunt, chairman of the committee. The contract must be ratified by the Council and authorized by a state law. Then the voters of the city must accept it. The value of the electric light and street railway properties will be fixed and the rate of return to the company agreed upon. The rates to be charged by the company will be fixed by the city, subject to appeal to the State

Railroad Commission. Surplus revenues beyond the rate agreed upon will belong to the city.

Newburgh Prepares for Complete **Bus Operation**

The Orange County Traction Company, Newburgh, N. Y., is preparing to get rid of its electric railway system and to supplant the entire line with buses. This change from railway to bus operation dates back to the fall of 1922 when the company replaced its crosstown railway lines with motor buses and organized a subsidiary, the Newburgh Public Service Corporation, to conduct its bus business. This company has since been granted a franchise by the Council to operate buses over the company's 6-mile route from Newburgh to Orange Lake which passes through one of Newburgh's suburban residential districts. A similar petition is now before the Public Service Commission. The latest development is the plan to turn its main city line over to the bus corporation, effective on May 1, 1923.

The fact that the crosstown bus lines carried more passengers than the trolley lines coupled with the fact that the cost of operation was about 37 per cent cheaper influenced the railway in reaching this decision.

Shore Line Bought—Operation Planned

A. William Sperry of the Sperry Engineering Company and a prominent engineer of New Haven, Conn., is negotiating to purchase from the Shore Line Electric Railway the portion of the line on the east shore road from New Haven, Conn., to Saybrook, Conn. He plans to issue bonds of \$400,000 shortly, the necessary amount estimated to put the line in operation. It has not been used since 1919. Mr. Sperry was one of the builders of the road back in 1907. He stated that the power would be furnished by the Connecticut Company and that arrangements were to be made so that ears of one company could operate over the other's tracks. Mr. Sperry also stated that one-man type of cars would be used when the line was put in operation.

Mr. Sperry is confident that under the latest developed methods of electric railway operation the road can be run successfully. He is reported to have said:

said:

Since the shutting down of the road in July, 1919, several parties have negotiated for the purchase, but for various reasons were not successful in financing and putting the proposition together. It is proposed to re-equip the road with light-weight, double-truck, one-man, safety cars, seating forty-four deople, abandon the power house and purchase power in New Haven and build new substations in North Hranford and Clinton.

Among the many advantages that the new company will have over the old company are the very small canitalization, the light-weight cars with small cost of operation, the low cost of hower, the great reduction in labor devices and the one-man safety cars, the reduction in the cost of highway maintenance and taxes due to state legislation, development in the several towns since the road shut down and the establishing of the large State Park at Hammonassett Beach Madison if the sconomies can be made that appear noselible the Shure Line should prove a conflictive centure.

City Administration Proceeds with Rapid Transit Plan

Despite the hostile attitude of City Council and prospects of blocking plans for high-speed transit lines under existing law, Mayor Moore of Phila-delphia, and the city administration proceeded on Jan. 23 with plans to advertise for bids for the Broad Street subway by March 1.

Mayor Moore declared many letters have been received by him indorsing his attitude for a return of the 5-cent fare. While these communications were being received, the Philadelphia Rapid Transit paved the way for speeding up the hearings on its property valuation case before the members of the Public Service Commission.

The Mayor issued the following statement:

Director Twining and the Mayor were in Director Twining and the Mayor were in conference this morning concerning high-speed transit lines. The Mayor has asked the director for answers to certain specific inquiries and they are being prepared. They are expected to advise the public fully as to work on the Broad Street subway and the comprehensive plans. One of the subjects under discussion had to do with the suggested loop or extension of the Broad Street subway enst on Ridge Avenue to Spring Garden, thence to Seventh Street, south on Seventh Street to Christian and west to Broad. Broad.

Seventh Street to Christian and west to Broad.

This is Director Twining's suggestion to relieve the fierce congestion contemplated by any right angle eastern extension from Broad Street to City Hall. The Mayor is inclined to agree with the director that the Ridge Avenue-Seventh Street loop would satisfy all interested and would accommodate the greater number of people employed enst of City Hall who want to make connections north and south.

This proposed loop extension was under discussion between Director Twining and the engineers of the Philadelphia Rapid Transit Company, and was partially agreed to by Mr. Mitten's engineers before the president of the Philadelphia Rapid Transit Company broke off negotiations. The Mayor said he had no doubt this eastern extension would he brought to the attention of the Council, and when his own inquiries of the director were answered the comprehensive plan, including the Broad Street subway itself, would be better understood. derstood.

Appeals to Interstate Commerce Commission

The Supreme Court of the State of California has refused to grant a rehearing to the California Railroad Commission in the matter of the latter body's recent order for constructing a joint union passenger terminal for the steam roads and interurban railway lines entering Los Angeles. The Supreme Court on Dec. 19 annulled the order saying that the commission had exceeded its jurisdiction in ordering the project.

When the court set aside the board'a order, the commission announced its intention to appeal for a rehearing. This being refused, the commission, through its chief engineer, Richard Sachse, has now appealed its case to the Interstate Commerce Commission, the commission's chief engineer also appearing in behalf of the city attorney of Los Angeles. The matter has been reviewed in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 30, 1922 and Jan. 6, 1923.

On Jan. 23, 1923, the Municipal League of Los Angeles, in suggesting that the proposed union railroad terminal in Los Angeles be constructed at the intersection of Sixth Street and the Los Angeles River instead of at the Plaza Terminal, forwarded to the Interstate Commerce Commission an appeal that an investigation of the situation more far reaching than that of the State Railroad Commission be made.

In the brief forwarded it was suggested that a unification of all terminal facilities, excepting freight depots, including main tracks and spurs from the entrance of the city of Los Angeles to the harbor of Los Angeles be considered. Such an investigation as proposed would cover the entire holdings of the railroads involved in the matter. The proposed site suggested by the Municipal League is owned by the Union Pacific.

With acceptance of this site as a terminal, the league pointed out, unreasonable construction and operation expenses would be curtailed, saving the three transcontinental lines involved huge sums that could be devoted to improvements. In supporting the pleas for the Sixth Street site, the league cited specific undesirable features of the terminal recommendations as made by the State Railroad Commission.

New Bus Proposal in Saginaw

For the first time since the suspension of service on Aug. 10, 1921, by the Saginaw-Bay City Railway the citizens of Saginaw will express their choice March 7 on a definite motor bus proposal for a city wide operation. that date a franchise will be submitted granting to the Saginaw Motor Omnibus Company, the right to do business. A week ago a franchise was presented to the Council, but on Jan. 27 all action was rescinded, and a new measure approved and ordered submitted. salient points of the measure are:

Term of grant, ten years.
Streets that will be served are named and cover present routes of the Saginaw United Transit Company, the outgrowth of the jitney buses with some additions. The routes will be determined after a traffic survey has been made by the grantees' engineers.

survey has been made by the grantees' engineers.
Council may order additional routes, but if there is a dispute between the city and operating company, it is to be settled by arbitration, each party to choose one, and if the two cannot agree, they are to select the third and the decision of the three is to be final.

All reasonable rules and regulations for the safety, welfare and accommodation of the public are to be made by the city.

All competition is to be prevented by legislative acts of the City Council.

All vehicles are to be of at least twenty-five passenger seating capacity and to be wide tread.

five passenger seating capacity and to be wide tread.

Rate of fare, 6-cent cash fare, eight school tickets 25 cents; universal transfers; firemen and policemen to be carried free. Council may compel company to issue ticket strips for the convenience of the public. The company reserves the right to charge a 5-cent fare to endeavor to increase the revenue passengers and may return to the 6-cent fare at its discretion.

City may purchase the property of the company on fifteen days' notice in writing, value to be fixed by arbitration. The value of the franchise is not to be considered.

The grantees are Leonard A. Henning, Saginaw, and John Wade, Atlantic City, N. J. They can not transfer or dispose of the franchise until a company is organized under Michigan laws, of at least \$500,000 capitalization, \$100,000 of which must be paid in, in cash, and orders placed for not less than forty buses. In addition to the grantees there are associated in the enterprise, Samuel Bogert and Walter Kutzleb, New York.

Want Road Restored to Owners

The railroads committee of the general Assembly will soon introduce a resolution which, if passed would place the Connecticut Legislature on record as favoring the return of the Connecticut Company to its owners and the discharge of the federal trustees, who are now in charge of the road. By federal decree of some years ago, dividing up the New Haven Road property, the Connecticut Company's affairs have been administered by five trustees, whose total yearly salary is about \$35,000.

The road is under jurisdiction of the Interstate Commerce Commission and the General Assembly has no power over it as far as changing its present status is concerned. It is, however, the sentiment of the committee on railroads that some steps should be taken to restore the road to its owners, and a bill to this end will be introduced.

Committee Formed to Promote **Better Relations**

The Washington Committee on Publie Information, with E. H. Thomas, formerly a newspaper man, as director, and offices in the Henry Building, Seattle, has been formed by the power, light, electric railway and a part of the gas utilities of the state. The director said that the purpose was to promote better relations between utility companies and their customers by bringing about a more complete understanding of its business by the general public and a more complete understanding of the general public by the men who conduct this great business. In part he said:

Our committee exists to furnish accurate information and facta about our business to any citizen or group of citizens. We will prepare and send out weekly information about the various phases of our industry.

dustry.

We do this in the belief that our business, which touches so intimately the domestic, social, commercial and industrial life of the people, is a matter of concern to the public.

In addition, we desire to offer the services of the committee as a bureau of general information on matters pertaining to the public utility business.

News Notes

Crash Demolishes Cars.—More than two score passengers were injured recently on the Buffalo-Niagara Falls high-speed line of the International Railway, Buffalo, N. Y., when a two-car train crashed into an electric locomotive near the Niagara Falls city line. The two cars were practically demolished.

Will Start New Department .- The city of Houston will establish a public utility department within sixty days with a complete staff to handle matters pertaining to the gas, electric light and electric railway companies. The expense of this new department by agreement will be borne by the public service corporations and the city.

Beacon Appears Every Month.—The Elmira Water, Light & Railroad Company, Elmira, N. Y., started some time

ago the publication of a monthly entitled Water-Light Beacon. The pamphlet is issued in the interests of the Water-Light Employees' Association and devoted to the purpose of increasing co-operation between the customers and employees.

Fire Destroys Building.—The threestory building occupied by the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., was almost totally destroyed and wrecked by a fire recently. Several adjoining buildings also were badly damaged. The loss to the railway was approximately \$75,000. Two firemen were injured.

Contract Signed.—The 1923 contract between Division 732 of the Amalgamated Association and the Georgia Railway & Power Company, Atlanta, Ga., was signed recently by P. S. Arkwright, president of the company, and B. E. Cook, president, and W. A. Skelton, recording secretary, of the local union. No significant changes were made in the contract.

Electrification Recommended .- In his annual report to the City Council R. C. Turner, city electrician of Atlanta, Ga., has recommended the electrification of all railroads operating within Atlanta's city limits. Mr. Turner believes that all railroads entering Atlanta should be compelled to abandon their steam engines at the city limits and enter under electric power.

Ontario Properties Disagree. - The managements of the Port Arthur and Fort William Railways in Ontario are disagreeing over more frequent service in Fort William and also a higher wage scale for the employees. Port Arthur has not agreed to the arrangement and Mayor Edmeston of Fort William has threatened to dissolve the joint agreement so that two systems shall be run separately. The cars of either city now run through the other.

Bill Requires Full Crews .-- A bill introduced by Mr. Higgins in the Senate on Jan. 26 at Albany would require full crews of uniformed guards for subway and elevated trains, of at least one guard to the car. However, the employment of one uniformed guard to operate the entrance and exit doors or gates of not more than two connected cars will be allowed on any subway or elevated passenger road made up wholly of cars having non-automatic and unlocked swinging or sliding doors at either end to permit free movement of passengers from car to car.

Employees Will Have Annual Dinner. Veteran employees of the Twin City Lines, Minneapolis, Minn., will have their association annual dinner Feb. 3 in the dining hall at the Snelling station in St. Paul. Most of the twentythree men who entered the service of the company in the 80's are expected to attend. Horace Lowry, president of the company, will return from the south in time to make an address. About 325 men who have been in the service twenty years or more have been invited by F. A. Anderson, social service director. Vice-president T. Julian McGill will give a talk.

Financial and Corporate

Reorganization Outline

Ohio Roads Will Be Continued in Service
—Drastic Changes Proposed in
Financial Structure

A plan has been worked out for the reorganization of the Columbus, Newark & Zanesville Electric Railway and the Columbus, Buckeye Lake & Newark Traction Company which provides for continuing both of these properties in regular operation. It also contemplates the payment of the general creditors in full. So far as the security holders are concerned, no provision is made in the plan for any holder of any of the bonds who does not deposit under the respective deposit agreements and assent to the plan and pay his assessment, nor is any provision made for any common or preferred stockholder of either company except such preferred stockholders as may purchase the right to subscribe to the securities of the new company.

Under the plan as now proposed, the successor company will be known as the Columbus & Zanesville Power & Railway Company. With respect to the details of the exchange of the various securities, this is of particular interest only to the holders of them. In this connection, however, it is of interest to note that Day & Zimmermann have submitted an estimate of earnings for the years ended Sept. 30, 1923, 1924 and 1925, with the new securities taken into consideration, which shows a balance of \$12,600 available for ear trust rentals, amortization, depreciation, federal taxes and dividends for the 1923 year, a balance of \$209,900 for the 1924 year, and a balance of \$263,700 for the 1925 year.

The reorganization committee points out that the railway lines of the Columbus, Buckeye Lake & Newark Traction Company and the Columbus, Newark & Zanesville Electric Railway constitute a single operating entity. The interurban line connecting Columbus, Newark and Zanesville is a through route, with a large volume of traffic passing between the sections upon which the Buckeye mortgage and the first mortgage are respectively a first lien. The disruption of this through route would largely destroy the earning power of both sections. The first mortgage is a first lien on about 80 per cent of the mileage of the Newark city line, the Buckeye mortgage being a first lien on the balance. A large part of the power used by the light and power property in Zanesville is generated in the Hebron plant, upon which the Buckeye mortgage also is a first lien. On the other hand, substantial and valuable portions of the railway system were constructed out of the proceeds of the general mortgage bonds.

It is pointed out that under such circumstances the segregation of the

property according to mortgage liens is impracticable, because it would destroy the earning power of the property and greatly increase the expenses of operation through the multiplication of overhead expenses incident to a number of separate operating organizations. A very substantial equity in earning power, both present and potential, in the Zanesville Light & Power property accrues to the first mortgage (constituting a second lien thereon) and to the general mortgage (which has n third lien thereon). The committee says that the successful reorganization must be predicated upon the retention of the equity in this earning power and the physical property from which it accrues.

An interesting part of the plan is that the reorganization managers will cause the common stock of the new company to the amount of \$2,670,000 to be deposited in a voting trust for a period of ten years.

The Columbus, Newark & Zanesville Electric Railway was incorporated on July 2, 1902, in Ohio. On April 1, 1904, it purchased the property and franchises of the Newark & Granville Street Railway. On June 1, 1906, it purchased the property and franchises of the Columbus. Buckeye Lake & Newark Traction Company, subject to the \$1,243,000 bond issued in 1901 still outstanding. On June 1, 1906, the property and franchises of the Zanesville Railway, Light & Power Company were also purchased. At the time of this acquisition the property was subject to a mortgage on the electric railway, of which \$270,000 was outstanding, due Feb. 1, 1919, extended to Feb. 1, 1924, at 7 per cent. At the present time the bonds have been refunded to the amount of \$247,000, leaving still outstanding \$3,000. On June 23, 1906, the property and franchises of the company were leased to the Indiana, Columbus & Eastern Traction Company. On Aug. 1, 1907, this lease was assigned to the Ohio Electric Railway. The Indiana, Columbus & Eastern Traction Company and the Ohio Electric Railway became insolvent in 1921, and the leases previously mentioned were terminated.

\$1,545,055 Net for Boston Elevated

Reduction in Basic Ten-Cent Fare Awaits Payment of Loans to Cities and Towns and Passage of Legislation to Remove Burdens Unjust to Car Rider—Public Trustees Hopeful for Future

'HE fourth calendar year of public operation of the Boston (Mass.) Elevated Railway shows a balance remaining after providing for all costs of service of \$1,545,055 after making allowance for delayed charges and credits. In July the trustees having restored the reserve fund to \$1,000,000, as required by law, paid \$517,196 to the cities and towns on account of their loan to meet the deficit of the first year of public operation. The unpaid balance of that loan is now \$3,462,955. A substantial surplus is expected to be available next July for the second payment to these eities and towns, but the trustees report that the probable amount cannot be definitely stated in view of the wellknown sensitiveness of railway costs to elimatic conditions and market fluctuations in the commodities which are used. The succession of storms during the past six weeks has already cost

more than \$200,000. Change of a dollar in price of a ton of coal makes a difference of \$275,000 in operating expense for the year.

While the trustees were engaged in the financial struggle against operating losses and for restoration of the credit of the railway the public was patient with them, but no sooner did it become known that the road had reached a selfsupporting basis than demands began to pour in on them. The taxpaying public urged the prompt reimbursement of their loan of 1919. The riding public appealed for lower fares. An equally large traveling public, less interested in fares than in service, urged larger accommodation. Restricted in law and still limited in revenue the trustees endeavored to meet in part each of these public needs. A large payment was made into municipal treasuries in reimbursement of loan. The 5-cent fare

	1922	1921	1920	1919	1918
Total receipts	\$32,699,176	\$33,277,025	\$34,031,638	\$29,498,582	\$21,062,692
Operating expenses:					
Wages	14,772,340	15,563,255	17,216,445	15,539,103	11,007,36
Material and supplies	2,903,650 555,355	3,093,934 518,249	3,310,838 640,163	3,640,063 701,907	3,248,31. 792,78
Depreciation	2,004,000	2,004,000	2,004,000	2,004,000	1, [84,67
Fuel	1,853,111	1,663,617	2,587,652	1,815,260	1,762,96
Total operating expenses	\$22,088,458	\$22,843,056	\$25,769,122	\$23,700,339	\$17,996,09
Taxes	1,387,186	1,546,758	1,142,987	1,045,502	917,51
Chap. 159, Acts of 1918)	3,727,859	4,203,061	4,102,230	4,002,656	3,233,540
Subway and tunnel rents	1,927,130	1,963,737	1,790,432	1,516,047	1,235,974
Interest on borrowed money	1,891,315	1,494,258	1,514,963	1,555,790	1,302,13
Miscellaneous Items	65,016	54,707	59,067	60,346	22,343
Total cost of service	\$31,286,987	\$32,105,380	\$34,378,803	\$31,880,682	\$24,707,633
Loss for year			\$347,167	\$2,382,099	\$3,644,941
Gain for year	\$1,417,189	\$1,171,444			

has been extended from time to time under the plan adopted for its development. The trustees point out, however, that while the 5-cent fare should completely cover transportation between community centers the 5-cent fare cannot now nor in the future become a general substitute for or an active competitor with the higher basic fare whether that be as at present 10 cents or, as it may be later, a lower charge. No substantial invasion of net revenue can be allowed until cities and towns have been reimbursed nor wherever such invasion would unreasonably postpone reduction in the higher fare. To meet the request for larger accommodation additional beneficial changes have been made in operation.

The accompanying comparative table presents a summary of receipts and expenditures for the past and preceding years.

During the year, with a view to more efficient service, additions were made to rolling stock. Thirty-six new steel cars have been placed in commission in the elevated service. Additional flat cars and snow sweepers have been purchased. In April 100 semi-convertible cars of the most modern type were ordered and seventy-one of them are now in use. These cars may be operated by either one man or by two men. Recently 100 more of this type of cars have been ordered for early delivery. For train service in the East Boston Tunnel forty steel cars have been ordered.

During the year approximately 21 miles of track were rebuilt and 7½ miles improved by substantial repairs. The new elevated car repair shop at Forest Hills is about completed and ready for use. The first unit of the new store house at George Street in Charlestown for the use of the maintenance department is nearly complete and construction of the second unit is under way.

TRAFFIC

The accompanying tables show that 19,341,862 more revenue passengers were carried in 1922 than in 1921 and that the total of 356,593,942 is the largest number carried in any year of public operation. This is ascribed by the trustees in part to the general awakening of business activities and in part to the extension of 5-cent fare routes. The increase of 868,391 in car mileage and of 285,947 round trips in comparison with the record of the preceding year indicates the increase in the service.

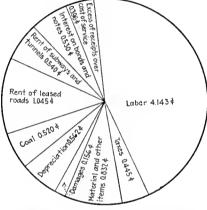
The trustees believe that where there is no compelling need of the most drastic economy the general substitution of the one-man car is not desirable. They are convinced, however, that the one-man car has its proper place on the Boston Elevated Railway, as

COMPARATIVE	PASSENGER	STATISTICS
REVENUE P	ASSENGERS	CARRIED

Year	Weekday	Saturday	Sunday	Holiday	Total for
	Average	Average	Average	Average	Year
1922	1,030,303	1,144,320	617,148	691,890	356,593,942
1921	975,745	1,068,295	578,860	696,691	337,252,080
1920.	960,737	1,072,319	591,063	703,634	335,526,561
1919.	934,918	1,078,635	596,182	706,429	324,758,685
1918.	985,384	1,147,809	658,902	775,634	348,664,700
1916	1,073,943	1,249,588	728,847	857,902	381,017,338
	1,050,038	1,218,749	718,804	832,962	373,577,908
1915	992,283	1,140,046	685,726	846,860	352,469,586

TRAFFIC	STATISTICS-	YEAR ENDED	DEC. 31	
	1922	1921	1920	1919
Round trips operated Passenger revenue Passenger revenue per car-mile	6,059,531 \$31,834,022.77	5,773,584 \$32,253,629.59	5,764,347 \$33,108,946.48	6,578,069 \$28,767,544.11
(cents). Passenger revenue per ear-hour. Passenger revenue mileage Passenger revenue ear-hours. Revenue passengers earried.	62 . 94 \$7 . 09 50,575,088 4,487,400 356,593,942	64.89 7.36 49,706,697 4,381,815 337,252,080	64.62 7.16 51,237,527 4,627,295 335,526,561	53.74 6.06 53,533,522 4,749,318 324,758,685
Revenue passengers carried per ear- mile	7.051	6.785	6.548	6.066
car-nour.	79.47	76.97	72.51	68.38

proper as that of the train or the individual two-man car or the motor omnibus; that its use means more frequent service and often makes possible the development of the 5-cent fare. They do not agree that it is suited to conditions of heavy traffic for the reason that its use is then apt to annoy pas-



Allocation of receipts per passenger

Twelve Months Ended Dec. 31, 1922. Average Receipts per Revenue Passenger 9.169c.

sengers in boarding the car and to interrupt schedules, causing delays that interfere with convenient and efficient service.

One of the most important railway measures before the Legislature last winter proposed the extension of the rapid transit facilities from Andrew Square to Fields Corner in connection with the purchase or taking of the Shawmut Branch of the New York, New Haven & Hartford Railroad. A bill to carry out this plan based upon the previous study and recommendation of the Department of Public Utilities is before the present Legislature. The trustees favor this project as the only

one that will effectually relieve the congestion at Andrew Square.

On June 10, 1921 the railway property of the West End Street Railway, which had been operated since October, 1897, by the Boston Elevated, under lease from the West End, was consolidated with the railway property of the Boston Elevated under the provision of chapter 740 of the Acts of 1911. The consolidation was effected as provided in the statute by an exchange of the outstanding preferred and common stock of the West End at par for an equal amount at par of first preferred and second preferred stock of the Boston Elevated.

At a hearing before the Department of Public Utilities in September the trustees submitted an outline sketch of possible extensions of service. The plan was suggestive only, was not claborate in detail, and did not reflect the conclusions of engineering experts. It served its purpose, however, in calling attention to the present need of some comprehensive and harmonious plan to which individual extensions of the Boston Elevated Railway should hereafter conform. One feature of the sketch proposes an independent trunk subway in Huntington Avenue which would provide a future extension to the north of Boston. This would bring additional rapid transit where the need is imperative. It would also provide a permanent improvement in place of makeshift changes at Park Street, making the station there less of a terminal

STATEMENT OF SPECIAL TRUST FUND, DEC. 31, 1922.

BOSTON ELEVATED RAILWAY TRUSTEE

Principal of trust fund as established Accretions and accumulations of income	\$1,500,000
to June 10, 1922	707,342
Total special trust fund	\$2,207,342
Investmen in marketable securities and	20,112
real estate	\$2,207,242 20,212

1	BOSTON ELEVAT	ED RAILWAY	Y POWER ST.	ATISTICS			
	1922	1921	1920	1919	1918	1917	1916
Tons of coal burned Pounds of coal per kilowatt-hour. Average price of coal per ton Net cost of power for car service per kilowatt-h	. 2.553 . \$6.777	215,870 2.714 \$7.71	258,087 2,353 \$10.07	287,670 2.835 \$5.91	281,677 2.772 \$6.26	270,452 2.309 \$4.19	254,735 2.256 \$5.35
(cents). Net cost of power per total revenue car-mile (cents). D. C. annual output (kildwatt-hours). D. C. maximum hour output (kilowatt-hours)	. 1.414 . 6.153 239,905,874	1, 172 4, 815 222,461,060 75,905	1.921 8.538 245,676,503 72,295	1.307 5.439 239,892,118 71.700	1, 158 4, 668 227,582,057 67,965	. 620 2. 573 262,343,882 79,535	.534 2.137 252,896,235 75.380

station and a more adequate way station. Another feature of the sketch proposes an extension of rapid transit to the north of Boston through use of the Saugus branch of the Boston & Maine Railroad in connection with the elevated line that now has a temporary terminal in Everett.

In this connection the trustees say that the Metropolitan Planning Board advocated by the Boston Chamber of Commerce and recommended by the Department of Public Utilities could achieve much for the public welfare in the study and determination of the proper methods for the development of railway transportation.

The trust fund is held by the Boston Elevated Railway under Chapter 740, Acts of 1911-"An Act to authorize the consolidation of properties and franchises of the Boston Elevated Railway and the West End Street Railway"and represents the proceeds from the sale to the Boston Elevated Railway of real estate of the West End Street Railway which was not required in the conduct of the business. The amount so received (\$1,500,000) was held by the Boston Elevated Railway and invested by it and allowed to accumulate until June 10, 1922. Hereafter the annual income therefrom will be applied toward the purchase and retirement of the second preferred stock of the Boston Elevated Railway. No part of this fund or its income can be used for any other purpose.

Community Enterprise Makes Money

At the annual meeting of the Tygarts Valley Traction Company, Grafton, W. Va., General Manager Alexander read a report showing the earnings of the company from operation for the year were \$47,404; total expense \$37,196 and net earnings \$10,208. There was deducted from these earnings the sum of \$4,126, including taxes and interest on the funded debt, which left a net profit of \$6,083.

The company is a community enterprise, having been taken over by a public subscription campaign after the road had been in financial difficulties and was ready to suspend operations. Improvements needed were listed as a rotary converter for substation, more steel ties with which to complete Main Street track and the rebuilding of Doresey Street bridge, in all an expenditure of about \$20,650.

Investment Company Organized

The Puget Sound Power & Light Company is seeking a broader market for its securities. As a step in this direction A. W. Leonard, president, and W. H. McGrath, vice-president, have incorporated the Puget Sound Power & Light Securities Company, with a capital stock of \$50,000, to handle the common, preferred and prior preference stock of the parent company in the Pacific Northwest territory. The power company has been very successful in selling to its customers, employees and general

public its preferred stock and prior preference preferred, in the last two years, having sold more than \$3,000,000 of its securities in the Northwest. Officers of the new Securities Company are: A. W. Leonard, president; W. H. Mc-Grath, vice-president; James B. Howe, secretary; F. W. Brownell, treasurer; Frank Dabney, manager.

\$6.16 on Common Stock-1923 a Promising Year

For the year ended Dec. 31, 1922, the Twin City Rapid Transit Company, Minneapolis, Minn., and subsidiary companies realized a net income of \$1,565,201 after charges and taxes. This is equivalent after deduction of preferred dividends to \$6.16 a share earned on the \$22,000,000 common stock. The net income for the previous year was \$697,304 or \$2.21 a share on the com-

STATEMENT OF EARNINGS OF TWIN CITY LINES

Surplus	\$475,201	\$47,304
Net income	\$1,565,201	\$697,304
Prefered dividends	210,000	210,000
Common dividends	880,000	440,000
Total Income	\$2,675,639	\$1,791,141
Interest, etc	1,110,438	1,093,837
Gross revenue Net after tax Other income	\$13,772,647 2,606,398 69,241	\$13,865,581 1.735,409 55,732

mon stock. The income account for the year just ended is compared in the accompanying table with the previous year.

In his remarks, to the stockholders President Horace Lowry referred to the valuation of the property, saying that the companies had completed their own valuations and were ready to submit their case as soon as the State Railroad & Warehouse Commission fixed the date. He said in part:

date. He said in part:

Determination of the fair value of the properties is of first importance to both the properties is of first importance to both the public and the operating companies, but pending such determination we have explained to the clites the impossibility of spending for extensions, betterments and renewals any sum in excess of the amount charged to operation for depreciation.

It has been made clear to the authorities of the two cliles that the companies are trying to accomplish as much as possible with the funds available from this source, but that such funds so used for capital additions must be repaid to the depreciation reserve when the commission shall have finally fixed the value of the properties and authorized the financing necessary to refund outstanding bonds and provide for additional capital expenditures and future betterments.

Vour management believes the public has

Your management believes the public has Your management believes the public has a better knowledge of street railway affairs now than in 1921. This is an important development and should help to bring about better public relations, continued good service, and a reasonable return to the service, and a reasonable return to the stockholders on fair value of their property,

February Maturities Nearly \$18,000,000

Electric railway maturities which feli due on Feb. 1 amounted to approximately \$18,000,000. The largest item was the Brooklyn Rapid Transit Company's 6 per cent receivers' certificates of \$14,000,000. Other items included the \$1,400,000 Consolidated 5s of the Cleveland & Southwestern Traction Company and \$565,000 of the Canton-New Philadelphia Railway's first 5s.

Seeks Authority for \$7,192,000 Issue

The Interstate Public Service Company of Indianapolis has filed a petition with the Public Service Commission asking for authority to issue \$7,192,-000 of 6 per cent twenty-five-year first and refunding gold mortgage bonds to be used to retire \$4,048,000 of bonds issued by the company and outstanding and to retire \$3.144,000 of outstanding bonds of underlying issues on properties bought by the Interstate company. The petition asks for authority to sell the new issue at not less than 89. It is proposed to date the bonds Feb. 1. 1923, and to secure them with a mortgage on all the property of the company. The Public Service Commission issued an order Dec. 22 of last year granting a petition filed a month previous permitting the Interstate to purchase a number of properties.

Pays Rent for Using Viaduct

The Kansas City (Mo.) Railways, through its attorney, Judge James E. Goodrich, has just paid to John B. Pew a check for \$34,776 for rent on the Intercity viaduct from Sept. 9, 1920, to July 1, 1922. This is the first money paid by the company to the city for the rental of the viaduet since the cars began to cross the structure in May, 1919. Judge Kimbrough Stone of the Federal court made a recent ruling which gave Kansas City, Kan., and Kansas City, Mo., \$30,000 a year for the use of the viaduct by the railway. Kansas City, Kan., will receive 44 per cent and Kansas City, Mo., 56 per cent.

1923 Earnings to Be Used in Muskegon

Alanson L. Lathrop, New York, president of the American Light & Traction Company, made an unusual promise to the directors of the Muskegon Traction & Lighting Company, Muskegon, Mich., at the annual meeting recently. Mr. Lathrop told the directors that not one cent of the earnings of the company would be taken out of Muskegon during 1923. This applies both to the railway and gas services.

It is expected that the earnings of the company will be about \$100,000. Plans are being made for the purchase of five cars to be put into service during the next six months, while extensions and improvement in service will also be effected as rapidly as possible.

Mr. Lathrop expressed himself as pleased with the treatment being afforded the company by Muskegon and Muskegon Heights, the two cities served. He also said that the company should not expect a return on its investment until the property had been improved.

"Mnny people believe we have the cars to accommodate them during the rush hours, but keep them in the carhouse," said George Steinwedel, president. "We believe the people should know that all available cars are in operation, and that we are doing all possible to give service."

Interborough Has Good Quarter

Net earnings of the Interborough Rapid Transit Company, New York, for December, made public on Jan. 30 amounted to \$494,247 after allowing for interest on bonds, leaving a balance of \$344,247 after the deduction of the dividend on the Manhattan Railway stock under the plan of financial readjustment now in effect. For the last quarter of 1922 earnings ran well ahead of the requirement for the Manhattan dividend, now at the rate of 3 per cent.

\$9.536,070 have been taken into account. This \$9,536,070 is the amount the subway has failed to earn up to the present time before the city participates in any profits. For the quarter, earnings fell below the preferential requirement, so that payments to the city are farther away than ever.

Colonel Murphy explained that the figures were not in comparative form because the financial readjustment made it impossible except for the items of gross and net. The gross for the three

STATEMENT OF NET EARNINGS OF THE INTERBOROUGH SYSTEM UNDER THE

READJUSTMENT PLAN

Total revenues Operating expenses, taxes and rentals paid city for the old subway	Month	Three Months Ended Dec. 31, 1922 \$14,539,959 10,158,490
Income available for all purposes. Fixed charges: Interest on I. R. T. 1st mortgage 5% bonds Interest on Manbattan Railway boods. (A) Intereat on 1. R. T. 7% secured notes.	\$1,556,986 \$669,203 150,686 190,908	\$4,381,468 \$2,007,611 452,060 573,747
(B) Interest on I. R. T. 6% ten-year notes. Miscellageous income deductions.	\$1,010,799 \$546,187 968 50,971	\$3,033,418 \$1,348,050 968 150,630
Earnings without deducting the sinking fund on the Interborough Rapid Transit first mortgage 5% bonds (\$176,758 for the month of December and \$529,895 for the quarter), which, under the plan, does not become operative nutil July 1, 1926, but which must be deducted from earnings of the system before arriving at the sum available for dividends on Manhattan stock. Dividend on \$60,000,000 Manhattan stock at 3% annual rate.	\$51,939 \$494,247 150,000	\$151, 599 \$1,196,450 450,000
Balance	\$344,247	\$746,450

RECONCILIATION WITH REPORT TO TRANSIT COMMISSION

	Month	Ended
Net corporate income as reported to Traosit Commissioo	\$167,489	
Equals above balance	\$344,247	\$746,45

Notes: (A) When the plan was consummated it became operative generally as of July 1, 1922. However, as to both note issues the changes in fixed charges intended to be brought about by the readjustment were not effected until almost the close of the year. For both the mooth and the quarter ended Dec. 31, 1922, the interest on the 7% secured notes, shown above, is calculated on the portion of the entire \$38,144,400 of three-year notes of 1918 chargeable to operation, rather than on \$34,330,000 of new ten-year notes. Consequently in similar

statements for subsequent periods this item will not

These Months

statements for subsequent periods this item was abe so large.

(B) \$10,500,000 of the new ten-year 6% debenture notes having been issued on Dec. 27, 1922, the forcolly four days. Attention is directed to the fact that after deducting all other interest charges there was available for interest on these notes \$49,215 in Dec. and \$1,197,419 for the quarter. The interest on this entire issue for corresponding periods would be \$52,500 and \$157,500 respectively.

In commenting on the figures, Colonel Grayson M.-P. Murphy, chairman of the executive committee of the company, declared that while all requirements under the plan were not earned during the last half of 1922, when the plan was operative for the first time, there is every indication that they will be before the end of the fiscal year on July 1, 1923. This belief is based on the fact that if earnings are as good the next two quarters as they were in the last, requirements will be covered by a satisfactory margin.

The Interborough continues to carry out its policy of introducing a number of economies, President Frank Hedley stating that the savings from use of the feather-weight gates have paid for their installation three or four times over during the year.

Col. Murphy also stated that December earnings were large enough to allow a sum of \$48,839 to be credited against the city's investment in the rapid transit lines. However, no payments can be made to the municipality until accrued preferentials amounting to

months ended Dec. 31, 1921, was \$14,-140,048, while the net was a deficit of \$194,603, making the showing for the last quarter of 1922 \$411,158 better than that for the last quarter of 1921.

Directors Elected

On Jan. 8 a stockholders' meeting of the Olean, Bradford & Salamanca Railway was held in Olean, N. Y., vicepresident James P. Quigley presiding, for the election of a board of directors and the transaction of the general business of the company.

The following directors were elected: C. N. Mason, L. W. Osborne, W. O. Hay, Jr., James P. Quigley, W. A. Dusenbury, W. G. Baker, Jr., H. M. Watts, T. Duncan Whelan and E. B. Vreeland.

At a meeting of the board of directors held on Jan. 25 in New York City C. N. Mason was re-elected president of the company, James P. Quigley was reelected vice-president and C. A. Graves was elected vice-president in charge of operation and to succeed R. H. Wheeler as general manager of the company after April 1.

Toronto Must Pay \$11,188,500

The arbitration board which has been considering the amount due Sir William Mackenzie and his associates from the city of Toronto for its seizure of the Toronto Railway in 1921, decided on Jan. 31 on the sum of \$11,188,500. The city authorities previously stated they would appeal if the award was greater than \$7,000,000.

Auction Sales in New York .- At the public auction rooms in New York, there were no sales of electric railway securities this week.

Net Income of \$1,418,020.—The Market Street Railway, San Francisco, Calif., for the twelve months ended Dec. 31, 1922, reports a railway operating revenue of \$9,583,437 and operating expenses of \$6,860,038. The net income was \$1,418,020.

Claims Being Filed .- Creditors of the Northampton, Eastern & Washington Traction Company, Phillipsburg, N. J., other than bondholders, who may claim to have a lien superior in rank to the lien of the mortgage securing said bonds are now filing their claims with Counselor Linton Satterthwaite, 137 East State Street, Trenton. The United States District Court at Trenton has issued an order to the effect that the company's property shall be sold.

Bus to Replace Railway.-In view of the decision of the Supreme Court giving Receiver D. P. Abercrombie permission to suspend operation of the Concord, Maynard & Hudson Street Railway, the Board of Selectmen of Hudson on Jan. 16 decided to grant a bus line franchise of A. J. Lowell, Woburn, to begin operations at once. It is planned to maintain a bus service in the several towns and over the same route as the defunct railway has run since 1901. This is an 18-mile interurhan.

Receivers to Request Sale Date .--Properties of the Memphis (Tenn.) Street Railway may be sold within the next thirty days. Receivers of the company will request Judge J. W. Ross to set a date of sale soon. The same interests that purchased the Memphis Gas & Electric Company are expected to buy the railway. City commissioners have been advised that the railway proposes to pay its back taxes amounting to about \$200,000 on sale of the companies' properties.

Service Abandoned.-Service on the New Carlisle-Carlisle Junction branch of the Indiana, Columbus & Eastern Traction Company, Cincinnati, Ohio, stopped at midnight on Jan. 27, under orders issued from headquarters in Springfield, Ohio, in accordance with decisions of the courts and State Public Utility Commission authorizing abandonment of the branch. The line is 4.22 miles in length. The branch was built in 1901 as part of the Springfield & Western Traction Company's line, and was acquired in 1906 by the Indiana, Columbus & Eastern Company, then a part of the former Ohio Electric system

Traffic and Transportation

Mr. McAdoo Behind Bus Project

Railways in Los Angeles Oppose City Granting Franchise for Huge Bus System

William G. McAdoo, former Secretary of the Treasury, representing business interests in the East, presented an application to the City Council of Los Angeles on Jan. 23 for thirteen franchises for a bus system to serve 60 miles of streets in the city of Los Angeles. The backers of the new bus corporation, organized for \$2,000,000, no stock to be offered for sale, is represented by E. F. Simms, vice-president of the Sinclair Gulf Oil Company and Joseph L. Rhinock, both of New York. The director and manager of the company is Richard W. Meade, formerly with the Fifth Avenue Coach Company, New York.

The buses, of the double-deck type, would operate in the congested district and run to all parts of the city, the fare to be 10 cents, with a universal transfer system. The proposed buses would cover practically all territory reached by the Pacific Electric Railway and the Los Angeles Railway, but the fares on the buses would be higher than those on the street railways.

The petition of the bus corporation has been referred by the City Council to the Board of Public Utilities, which body received immediate demands from certain factions to hold a public hearing toward taking action at once on the matter

The public hearing of the Board of Public Utilities was held on Jan. 26. At it the local railways offered considerable opposition to the city granting the franchise. The Pacific Electric Railway officials threatened to discontinue all improvement work contemplated by it in Los Angeles, including the company's proposed \$3,000,000 subway to serve Hollywood and San Fernando valley points, if the bus franchise is granted. Retirement of both the Pacific Electric and Los Angeles Railway companies from the Los Angeles city transportation field, if the city grants the extensive bus franchises, also was threatened by the Pacific Electric officials. Civic encouragement of bus systems, they declared, will be interpreted as an official decision that street railway transportation is obsolete.

Finally the application by Mr. McAdoo was referred to the committee as a whole by the Board of Public Utilities. This action was taken over objection of President Leeds of the board, who urged that the usual routine should be followed and the matter be referred to H. Z. Osborne, Jr., chief engineer of the board for a study and report on the matter, Mr. Leeds openly declaring that reference of the matter to the committee of the whole took the matter

out of the hands of the board's chief engineer.

R. W. Meade, proposed manager of the new bus system, outlined the plans of his company before the board, declaring that fifteen routes over which the financial supporters of the bus system plan have asked franchises are tentative and subject to amendment. He stated that instead of taking away patronage from the street railways, the bus lines would work up business of their own. He declared the business on his bus lines would largely come from business men and downtown employees who now use private automobiles to reach their work. The initial investment of the huge bus system is given as \$1,750,000.

D. W. Pontius, vice-president and general manager of the Pacific Electric Railway, contended that through the construction of the Hollywood subway, as proposed by the company, immediate relief will be forthcoming to the traffic congestion on both Hill and Sixth Streets. He further stated that the company intends to launch a huge construction and improvement program, which would include the erection of a viaduct and overhead system out of the company's Sixth and Main Streets terminal, costing \$18,000,000, which it was declared would serve all outlying cities with rapid interurban service to the north, northeast, south and southwest of Los Angeles.

The railway officials argued that both railways would like to test the need for railway extensions through the installation of bus line service, and cited the fact that the Pacific Electric now has before the Beard of Public Utilities of the city of Les Angeles various applications for bus franchises for lines to serve as feeders for the company's routes in the Hollywood district.

Mr. McAdoo, attorney for the new bus corporation, in addressing the Board of Public Utilities contended that the proposed franchise for bus transportation facilities is extremely desirable in the form in which the application has been submitted to the city and that bus lines operated as it is proposed to do under the new grant never hurt street railway patronage.

"El" Tells Patrons How to Spend Vacation

Railways are always performing services but seldom a service such as the Chicago Elevated did for its patrons just prior to Christmas. Believing that a lot of people don't know what to do with a vacation when they have it the company issued a four-page pamphlet suggesting trips at low costs which would be instructive as well as entertaining to wile away the hours during the exceptionally long winter holiday. If the vacationist desired to indulge in botanical wonders in Garfield Park or

if he preferred to revel in the rug collection at the Art Institute or watch the birds and elephants in the Field Museum of National History the Chicago Elevated promised to transport all to their "Seventh Heaven" speedily, safely and cheaply. The pamphlet was of intrinsic value for preservation because of the map it contained and because of the possibility of its use as a future guide to the wonders of the city of Chicago.

Bill Proposed to Permit City Bus Operation

The Legislature of the State of Washington has been asked to consider a bill introduced by Senator Dan Landon of the appropriations committee, and a resident of Seattle, which will permit the city of Seattle and other cities of the first class owning municipal railways to own and operate buses in conjunction with the railway systems within the corporate limits of the city. The bill expressly removes any jurisdiction which the State Department of Public Works might have over such buses, and leaves their supervision entirely within the hands of the cities.

The bill is said to be for the purpose of permitting Seattle to operate buses in outlying districts, instead of extending the lines of the municipal railway. At the same time, it is also said to give the city the right to parallel and operate buses along the line of the Rainier Valley railway system, which did not fall into the hands of the city when the Seattle electric railway properties were taken over.

Five-Cent Fare Experiments to Be Terminated

Bringing to a close a test period of fourteen months on one line, and nine months on all lines in Norwalk, the Public Utilities Commission of Connecticut issued an order terminating on Feb. 4 the experiment which has been conducted to determine the adequacy of a 5-cent trolley fare.

On that date, the West Avenue line of Norwalk will permanently become a 5-cent line, and all others of the Norwalk division which have operated on a 5-cent fare basis since May 21, 1922, will be raised to the general state rate, which provides for a base fare of 10 cents or three rides for a quarter by the purchase of tokens.

Norwalk is the first city in the state to secure favorable action by the Public Utilities Commission to test the 5-cent fare. On Nov. 6, 1921, the commission put into effect on one line in Norwalk the pre-war rate of a nickel and the resulting increase of business was considered sufficient to warrant a further test of this rate.

A further order extended the 5-cent fare to all lines in May, 1922. The results of this test, however, show that riding did not double along lines in sparsely settled sections, and at the low rate of fare the company showed a deficit. Norwalk returns to the three rides for a quarter with the exception of one line, for a short period only, the

Public Utilities Commission having recently announced that a fare rate of two rides for 15 cents would become effective throughout the state on April 1, and the lines of every division, except those radiating from Main Street and Fairfield Avenue, Bridgeport, and the West Avenue line, so called, in Norwalk. The recent two rides for 15 cents decision of the commission was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Jan. 27.

Massachusetts Companies Petition to Operate Buses

Massachusetts is now taking up in earnest the question whether the electric railways shall own and operate buses as feeders to the street cars. Under current discussion is the move of the Eastern Massachusetts Street Railway to establish such a feeder line system. This company has a petition before the Massachusetts Department of Public Utilities asking for authority to acquire, own and operate jitney lines. Having secured the approval of the Utilities Department, which is almost a foregone conclusion in view of the attitude of this department toward the general proposition, the Eastern Massachusetts company will go before the authorities in the cities of Malden and Revere and ask for licenses to operate an auto bus service.

The company proposes to operate buses in Linden and in Malden proper to pick up passengers in territory formerly served by the electric railway. In Revere the company proposes to operate in Park Avenue. But both of these cities have demonstrated hostility toward the proposition and are likely to decline to issue any licenses to the company. For the present the Eastern Massachusetts has no plans under consideration for introducing the bus in any other city or town, but after the Malden and Revere question is settled it is expected to survey the field for bus service elsewhere.

The Springfield Street Railway has already secured approval from the Public Utilities Department to acquire, own and operate such feeder lines and is planning to go to the local authorities in its district for the requisite licenses. In fact, the company has already started bus service under plans reviewed in these columns.

The Boston Elevated Railway was granted this authority some time ago, and the Northern Massachusetts Street Railway has a bus petition pending before the Department of Public Utilities.

Additional Buses in Use.—The Puget Sound International Railway & Power Company, Everett, Wash., has recently received two additional buses, to be used in the company's motorized transportation system. Six buses are now operating, or about one-half of the contemplated change. Manager George Newall reports that the company and its patrons are well satisfied with the new mode of transportation.

Opposed to Lower Fare

Committee Discusses With City Officials Handling Railway Warrants—Comptroller Prepares Statement

A committee appointed by the Seattle Clearing House Association, and composed of three prominent bankers in the city, recently met with city officials to discuss the handling of the Seattle (Wash.) Municipal Railway warrants. The line went on the warrant basis on Jan. 25, warrants being issued for the half month salaries of employees and for supplies, amounting to virtually \$224,000, the warrants to be redeemed at the rate of \$18,000 a day. The line was put on a warrant basis for the purpose of meeting the interest payment on the street railway bonds on March 1.

At the joint meeting, the Clearing House Committee advised strongly against the present proposed plan of returning to a 5-cent car fare on March 1, pointing out that the present 83-cent car fare must be retained in order to continue the present status of the street car system. J. A. Swalwell, chairman of the committee, stated that recommendations to this effect will be presented to Mayor E. J. Brown, who favors the 5-cent fare. The committee states that it would require a 46 per cent increase in patronage to justify a 5-cent fare, and that in its opinion, such an increase cannot be expected.

A statement prepared for the committee by City Comptroller H. W. Carroll showed that even with 1,000,000 more patrons monthly, following reduction to a 5-cent fare, the city car lines will face a local indebtedness covered by outstanding 6 per cent warrants totaling \$1,138,400 by next Christmas.

The statement of Comptroller Carroll shows possibilities of a constant increase of indebtedness month by month. It not only allows for added patronage under a 5-cent car fare, but the 11 cents to be charged for transfers. After setting aside \$1,223,975 for interest and redemption on Feb. 1, for the March 1 payment, on the railway debt, the city will have but \$36,926 with which to operate the ten days between Jan. 20 and Feb. 1. On Feb. 1, the comptroller estimates the railway will have \$167,000 warrants outstanding and on March 10. only \$98,400. The system will be placed on a 5-cent fare basis March 1, so on April 10, the net warrant obligation will mount to \$187,400. Then the warrant obligation steadily increases to more than \$1,000,000 by the end of the year. With estimated daily collections reduced from \$17,700 to \$14,000 on March 1, added patronage and transfer charges have been generously considered, the City Comptroller states.

Superintendent of Utilities George F. Russell, in his report to the City Council on Nov. 1, 1922, estimated a deficit of \$1,000,000 at the end of the year, but allowed for no increase in traffic in his report. He now states that there is no reason to doubt that the city lines will handle 12,000,000 passengers monthly on the 5-cent basis, which is the number handled in December, 1919, at 5 cents.

His estimated increase in traffic is 4,000,000 monthly against the Comptroller's 1,000,000. He also states that the management of the lines expects to effect a saving of nearly \$400,000 this year in operating costs.

Half-Fare Rates for School Children Proposed

A bill amending the public utilities act of the State of California to make mandatory the granting of half-fare rates to school children by street railways was introduced in the State Assembly, on Jan. 24 by Assemblywoman Saylor of Berkeley. It is claimed that under the present laws it is optional with the street railway lines in the state; while some of them do grant half-fares to school children, others refuse to do so. In the proposed bill it is the intent to place the matter under the power of the State Railroad Commission. Half-fares are now allowed school children in San Francisco, Los Angeles, San Diego, Fresno and numerous other cities in the state, but they are not allowed in Oakland and Berkeley.

Will Not Bid on Bus Franchise —Proposes Six-Cent Fare

No bids will be submitted by the Pacific Electric Railway to the city of Santa Monica, Calif., on the bus transportation franchise advertised for sale by the city. Feb. 9 is the final date for receiving the bids. The railway has informed the city of Santa Monica that it will submit to the city its proposals for a comprehensive local service with a 6-cent fare. The terms of the city's proposed blanket bus franchise calls for a 5-cent fare. The present bus lines in the city of Santa Monica operate in competition with the local service of the railway. The company stated that for business reasons it would not bid on the bus franchise on a 5-cent fare basis.

Seven-Cent Fare in Effect.—The Danville Traction & Power Company, Danville, Va., put into effect on Jan. 1 the 7-cent fare recently approved by the City Council. The ticket rate is five for 30 cents.

Sells Tickets on Corners.—The Nashville Railway & Light Company, Nashville, Tenn., has started the practice of selling tickets for cars on the uptown corners. It is the belief that this will speed up service, while the passengers get on and off the cars.

To Make Traffic Survey.—To settle the problem of traffic congestion in the downtown business district of the city, the Los Angeles (Calif.) Railway will have a traffic survey made. Electric railway transportation has been handicapped by the congestion.

Higher Fares Wanted.—It is said that if the City Commission of Waco, Tex., does not give the Texas Electric Railway permission to increase its fares from 5 cents to 7 cents the company will operate only one-man cars on an eighteen-minute schedule.

Personal Items

New Commissioner

J. T. Whittlesey, Engineer Well Known in East, Appointed to California Railroad Body

James T. Whittlesey, prominent consulting engineer of San Francisco, has been appointed to a two-year term as commissioner on the California State Railroad Commission. After his graduation from Yale Mr. Whittlesey was with the Thomson-Houston Electric Company from 1889 to 1890. He then went to New York as consulting engineer, and in 1892 he entered electric railway service in Brooklyn. During the succeeding two years he was chief



J. T. Whittlesey

engineer of the Brooklyn Rapid Transit Company. In 1898 he became superintendent of the Stephenson Car Company of New Jersey. For three years following 1900 he was chief engineer of the United Electric Company of New Jersey, and following this held the same position with the Public Service Corporation of New Jersey. In 1912 Mr. Whittlesey removed to California and was retained by the Spreckels interests of San Francisco to advise them on utility matters. During the past five years he has been director of the Pacific Coast branch of the Engineering Business Exchange, with offices in San Francisco. He is a member of the A.I.E.E., A.S.M.E. and American Electrochemical Society.

Mr. Webster May Manage New Road

F. W. Webster, general manager of the Fresno (Cal.) Traction Company, will probably accept the managership of the Minarets & Western Railway, but will not withdraw from electric railway work. The new road, for such is the Minarets & Western, will operate between Fresno and High Sierra, handling minerals, lumber and passengers. P. is a wonderful territory through which the road will run, and apparently has very bright prospects. In addition to being general manager of the Fresno Traction Company Mr. Webster is also manager of the Visalia Electric Railway, Stockton Traction Company and Central California Traction Company.

J. L. Longino Manager

As Vice-President and General Manager of Alapco He Will Relieve President Couch of Details

J. L. Longino has been made vicepresident and general manager of the Arkansas Light & Power Company, which is serving forty-five cities and towns in Arkansas from eight central power stations in that State. The position of general manager was created in order to relieve H. C. Couch, president of the company, of many of the details of management which he has been handling and with the view of promoting even greater efficiency in the operation of the properties.

Mr. Longino was formerly operating superintendent of the Arkansas Light & Power Company and has served as its secretary and treasurer since organization. He was made manager about two years ago of the Pine Bluff Company, an associated public utility company, which operates the electric railway, power and water services in Pine Bluff. Mr. Longino will continue to manage the Pine Bluff Company, but will be relieved of some details by L. B. West, auditor of the company. The secretary-ship of the Arkansas Light & Power Company has been taken over by L. Garrett. No other changes in the official personnel of either company are contemplated, according to a bulletin issued by President Couch. In addition to its eight steam plants using for fuel oil, gas and pulverized coal from the Arkansas fields, the Arkansas Light & Power Company is now completing a small hydro-electric power station on the Illinois River near Russellville, Ark. It will distribute the electrical energy to be generated by the Caddo River Power & Irrigation Company, which is to erect three dams and power stations on the Ouachita River near Hot Springs National Park, Ark. Anticipating early completion of the Caddo River Power & Irrigation Company's initial power station the Arkansas Light & Power Company has recently completed a 66,000volt line from its present system of transmission lines to Malvern and Arkadelphia within a few miles of the site selected by the first power plant of the Caddo River Power & Irrigation Company.

Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., was re-elected president of the Indiana Public Utility Association at the meeting of the association held in Indianapolis on Jan. 25.

Mr. Casev at Atlanta

General Superintendent of Transportation at Buffalo Resigns to Join Georgia Company

William M. Casey has resigned as general superintendent of transportation of the International Railway, Buffalo, N. Y., to become superintendent of transportation of the Georgia Railway & Power Company, Atlanta, Ga. Mr. Casey's position has not yet been filled. Mr. Casey came to the International Railway three years ago from Washington, D. C., where he held the position of superintendent of transportation of the Washington Railway & Electric Company.

Mr. Casey was born in Ireland in 1870. He came to the United States at an early age. For many years he lived in Lawrence, Mass., where he received his early schooling. He went West in



W. M. Casey

1888 and enlisted in the United States Army. He served with distinction in many insurrections of the Indian tribes and in 1891 he received an honorable discharge. A year later he entered the employ of the Denver City Cable Company, as gripman. He was promoted to carhouse foreman in 1893 and served in that capacity until 1902, when he was promoted to division superintendent of the Denver Transway. Seven years later he was made trainmaster in charge of traffic and discipline and later superintendent of transportation.

Mr. Casey left the Denver system in 1916 to joint the staff of John A. Beeler, traffic expert, then engaged on a survey of the traction lines at Washington, D. C. Five years ago he was appointed superintendent of transportation of the company and served in that capacity until he went to Buffalo. Mr. Casey succeeds S. E. Simmons with the Georgia Railway & Power Company.

P. R. T. Traffic Engineer Appointed to Buffalo

R. Harland Horton has been appointed assistant to the vice-president of the International Railway, Buffalo, N. Y., in charge of traffic over the local and suburban lines of the company, according to announcement made by

Herbert G. Tulley, president of the International. Mr. Horton comes to Buffalo from Philadelphia, where he had been associated with the Philadelphia (Pa.) Rapid Transit Company as traffic engineer for several years. Mr. Horton fills a new position created by President Tulley as assistant to Edgar J. Dickson, vice-president of the International.

Mr. Dell with Association

Office of Director of Exhibits Will Be Filled by Former Association Attache

Frederick C. J. Dell has been made director of exhibits of the American Electric Railway Association. Mr. Dell will enter upon his duties at once. It would not do to say that they are new duties to him, for they are not. He is thoroughly acquainted with them by previous experience. In fact, it was his able discharge of similar duties in the past that made Mr. Dell the one man above all others to whom the association knew it could intrust the responsibilities of the job. His appointment in fact illustrates again the correctness of the remark of Emerson about the world making a beaten path to the door of the man who does his job better than any one else. Metaphorically, that is just what the association It beat a path to the office of Benjamin A. Hegeman, the president of the National Railway Appliance Company, New York, in quest of Mr. Dell. Mr. Hegeman was, of course, reluctant to relinquish his claim upon Mr. Dell as secretary of that company, but Big Ben, as Mr. Hegeman is familiarly known, has again done a generous thing primarily in the interest of Mr. Dell, but a still bigger thing in the interest of the association.

Freddie Dell, as he is best known, has carved his own career from the very beginning. His business record entitled him to several cum laude degrees, but that record was made in the school of hard knocks and not in the classroom or laboratory. Mr. Dell took the business world by the tail, as it were, in the office of the Interborough Rapid Company in 1904. It wasn't much of a job that he had at the start, that of application clerk in the office of Frank Hedley, vice-president and general manager, but it was the opportunity and not the job that Mr. Dell was after. From Sept. 15, 1904, to March 1, 1911, Mr. Dell was with that company. An application clerk with keen powers of observation can learn a lot about human nature. Mr. Dell was such a clerk. In consequence he took with him a fund of such information gained in that position and the other posts which he filled with the Interborough, all carefully classified, when on March 1, 1911, he became assistant to the secretary and treasurer of the American Electric Railway Manufacturers' Association.

This position with the association he retained until May 15, 1916, when he was made assistant to the director of exhibits for the Atlantic City conven-

tion of the American Electric Railway Association. This was the first exhibit handled by the association itself after the manufacturer members had accepted the invitation extended by the parent organization to join its ranks.

Long before that, however, Mr. Dell had been an active participant in the work of directing the arrangements for the yearly conventions. In fact, he attended the Denver convention of 1909 as assistant to Secretary-Treasurer George Keegan of the Manufacturers' Association and the 1910 convention in a similar capacity. Meanwhile several of the manufacturer members of the association began to cast furtive glances in the direction of Freddie, but that was all the good it did them. On Jan. 17, 1917. however, Mr. Dell did succumb to the proffer made to him by Mr. Hegeman and entered his employ as secretary. Mind you, that was in January, 1917. One year and eleven months later Mr. Dell was made secretary of the company of which Mr. Hegeman is the head. To be exact this was on Dec. 24, 1918-



F. C. J. Dell

a Christmas present. Meanwhile Mr. Dell had been elected secretary of the American Electric Railway Manufacturers' Association. This was on Oct. 1, 1916, and he continued in that capacity until the association was disbanded on Jan. 8, 1920.

Mr. Dell's first work for the association now will be to enter actively into the work of the Committee of 100 in its campaign for additional funds. He will also be assigned to assist the membership committee in its continuous campaign for new members in the association. Mr. Dell has two hobbies. One of them is work. The other is his family. He is a member of the Lotos Club and is assistant to the secretary of the club. He is also a member of the New York Railroad Club.

Mr. Cadle in Engineering Practice

Charles L. Cadle, formerly chief engineer of the New York State Railways, plans to establish an office in Rochester as a consulting engineer, specializing in the problems of electric railway, light and power properties. Mr. Cadle retired on Jan. 17 as state superinten-

dent of public works, in which post he was in charge of the Barge Canal. During his administration tonnage carried on the canal almost doubled, and the gain last year was approximately 48 per cent.

From 1904 to 1906 Mr. Cadle was with the Cleveland Railway. He next became manager of the Electric Railway Improvement Company, Cleveland, and in 1917 went to the New York State Railways as electrical engineer. Two years later he was appointed chief engineer of the New York & Harlem Railroad. Meanwhile, however, he continued his duties with the New York State Railways in Utica, Syracuse and Rochester.

Changes Announced in Tennessee Commission

Dorsey B. Thomas, Camden, has been elected secretary of the Tennessee Railroad & Public Utilities Commission. He succeeds J. H. Corbitt. Porter Dunlap, McKenzie, has been sworn in as a commissioner to succeed W. N. Beasley, Halls, Republican, who held office only a few months. Gen. Harvey Hannah, Oliver Springs, long a member of the commission, has been elected chairman.

Changes Announced in Byllesby Organization

In addition to the election of Francis C. Shenehon as vice-president and director of the Byllesby Engineering & Management Corporation, New York, N. Y., in charge of all engineering and construction, effective Jan. 1, 1923, the election of Halford Erickson as vice-president and director has been announced. He will be in charge of operation of all of the subsidiary utility properties which are included in the system of the Standard Gas & Electric Company.

Mr. Erickson for many years was a member of the Railroad Commission of Wisconsin, and for two years, 1915 and 1916, he was chairman of that commission. For the last five years he has been vice-president of the Louisville Gas & Electric Company.

The following have been elected vicepresidents of H. M. Byllesby & Company:

R. G. Hunt, who has been with the organization for nineteen years and for seventeen years has been assistant to the vice-president in charge of operation of Byllesby Engineering & Management Corporation.

Joseph H. Briggs, who has been connected with the organization for fourteen years, and for the last four years has been manager of the bond department.

B. W. Lynch, who has been connected with the organization for eighteen years and has been auditor of the Byllesby Engineering & Management Corporation.

M. A. Morrison, who has been connected with the organization for fourteen years as assistant secretary and assistant treasurer.

F. W. Brown Superintendent Western and Northwestern Michigan Lines

New appointments on the Michigan Railway have become effective because of the resignation of H. P. Harrsen, assistant general manager, who, as noted previously in the ELECTRIC RAIL-WAY JOURNAL, becomes identified with the Electric Bond & Share Company, New York.

F. W. Brown, formerly traffic manager, now is general superintendent of the western and northwestern divisions.

J. II. Weldon, formerly chief of the tariff bureau, is traffic manager.

O. J. Hansen, formerly chief clerk, is superintendent of western division.

J. C. Taylor, formerly trainmaster, is superintendent of the Northwestern division.

C. P. Gerth, formerly local freight agent, is chief of the tariff bureau.

S. E. Simmons Leaves Atlanta Company

Important changes are announced in the personnel of the railway department of the Georgia Railway & Power Company, Atlanta, Ga.

S. E. Simmons, for a long time superintendent of transportation, has relinquished that position to go to Florida for the benefit of his health. W. H. Flury was acting superintendent, but William M. Casey has been appointed to succeed Mr. Simmons.

W. H. Matthews, also with the company for many years, has resigned from the position of assistant superintendent to enter business for himself. His successor has not yet been selected.

W. F. Edwards has been made an assistant superintendent of transportation of the company succeeding Edward Gramling.

John G. Huntoon, vice-president of the Tri-City Railway, Davenport, Iowa, has announced his candidacy for the Mayoralty of Rock Island, Ill., in the spring elections.

C. A. Graves has been elected vicepresident in charge of operation of the Olean, Bradford & Salamanca Railway, Olean, N. Y. He will also succeed R. H. Wheeler as general manager, effective April 1.

Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, was sworn in on Jan. I as a member of the Philadelphia Board of Education. He succeeds in this capacity the late John Wanamaker.

R. R. Ray, formerly with the Philadelphia (Pa.) Rapid Transit Company, has been appointed secretary of the new Co-operative Association, organized among the employees of the International Railway, Buffalo, N. Y.

Cornell S. Hawley, president of the Consolidated Car Heating Company, has been appointed a deputy administrator by Gen. George W. Goethals, state fuel administrator of New York. Mr. Hawley succeeds Guy D. Hills, resigned.

Gen. Lincoln C. Andrews, recently appointed receiver for the New York & Queens County Railway, Long Island City, N. Y., has also accepted appointment as general manager of the Long Island Electric Railway and the New York & Long Island Traction Company.

C. W. Eby, assistant chief engineer of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, read a paper "Taxation of Motor Buses and Trucks on State Highways" before the Iowa Engineering Society on Jan. 24. It is expected that this paper will be abstracted for publication in an early issue of Bus Transportation.

Matt Spitz has been appointed superintendent by the board of directors of the Gary & Southern Interurban line operating between Gary and Crown Point, Ind. C. J. Fifer, who had charge of the interurban line for several years, is returning to Akron, Ohio, to engage in business.

Col. Charles Keller was re-elected chairman of the Public Utilities Commission of the District of Columbia by the commissioners at a board meeting on Jan. 26. Commissioner Rudolph praised the work of Commissioner Keller as chairman of the commission since his appointment as engineer commissioner of the District.

1. W. Ross, formerly vice-president and chief engineer of the Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala., has now become president, general manager, chief engineer and purchasing agent. J. S. Billings, formerly treasurer, auditor, general freight and passenger agent, now assumes the title of secretary and treasurer, relinquishing the title of general freight and passenger agent.

Frank H. Gaskill, formerly a member of the secret service staff of the Philadelphia (Pa.) Rapid Transit Company, has been appointed superintendent of intelligence of the International Railway, Buffalo, N. Y. Mr. Gaskill has been in Buffalo since the outset of the strike of employees of the company July 1, 1922, and played an active part in the investigation which brought about the indictment by the federal grand jury of thirteen striking employees and State Senator Robert C. Lacey on charges in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line car last fall.

H. E. Chubbuck, vice-president executive of the Illinois Traction System. Peoria, Ill., was elected a director of the Merchants' and Illinois National Bank of that city at the Jan. 9 meeting of the stockholders of that institution. Mr. Chubbuck has long been a stockholder in the bank and his election to the directory is highly pleasing to his Peoria friends. Mr. Chubbuck has been seriously ill, but his condition is now reported to be much improved. Some of the down state newspapers recently ran rather startling news as to the nature of his Illness, but this was found to be untrue. He is now expected back to the office in due time.

Obituary

Henry M. Whitney

Henry M. Whitney died at his home in Brookline, Mass., on Jan. 25 at the age of eighty-four. Until his retirement from active business affairs several years ago Mr. Whitney was an international figure as financier and transportation magnate. He had a good deal to do with laying the foundation for the system now known as the Boston Elevated Railway. In fact, in 1887, largely through his instrumentality, eight horse railways at Boston were consolidated into the West End Street Railway with Mr. Whitney as president. No sooner had the roads been brought together than Mr. Whitney began to east about for a better method of propulsion of the ears. His plans for installing the cable were already far advanced when his attention was invited to the possible use of the electric motor.

A visit to Allegheny City, Richmond and Washington convinced Mr. Whitney that the new system was what he desired. A contract was made by him for the equipment of the line to Allston, partly with conduit and partly with the overhead trolley. The conduit portion was a failure and the portion equipped with the trolley was extended later downtown. This was the beginning of full electrification in Boston. The step of installing electricity at that time was a bold one but the success of the Boston lines was recognized and had a great deal to do with the extension of the

electrical system.

It is interesting to note that while Henry M. Whitney was thus the leading figure in the transit development of Boston, his brother, William C. Whitney, was undertaking similar work in New York through the Metropolitan Street Railway, with the co-operation of Messrs. Widener and Elkins of Philadelphia. Henry M. Whitney continued for many years to be a factor in the transit situation in Boston, but gradually turned his attention to his many other interests, including steamship lines and mining. He was one of the organizers of the Dominion Coal Company, out of which grew the present coal and iron industry at Cape Breton, N. S. It was said of him that "no American ever did more for Canada."

William H. Simms, for eight years librarian of the Department of City Transit of Philadelphia and formerly general manager of the Philadelphia & Western Railway, is dead. He was a native of England.

E. T. Nye, general manager of the West Jersey Electric Company and the Five-Mile Beach Electric Railway, died on Jan. 30 at his home in Wildwood. He had been with the above mentioned companies for the past sixteen years, and prior to his going to Wildwood, had charge of the electric light company in Pleasantville, N. J.

Manufactures and the Markets

News of and for Manufacturers-Market and Trade Conditions A Department Open to Railways and Manufacturers for Discussion of Manufacturing and Sales Matters

Car Equipment Purchases

It has been some time since this department of the Journal carried the news that the electric railways would do well to be forehanded in looking after their needs for new cars and car But that situation has equipment. again come to pass, for most of the car builders' and motor manufacturers' plants are now scheduled to capacity for some time to come. Railways that hold off in placing orders until they actually are badly in need of the new equipment are likely to have to wait several months for delivery, according to present indications.

Deliveries are rapidly lengthening and orders placed now with some of the car builders are not likely to be filled before well toward the end of the year. Furthermore, the prices of cars and motors and other car equipment are in prospect of increasing, on account of the demand and on account of the recent increases in steel costs, averaging about 5 per cent, which presumably will be reflected in the manufacturers' prices when present steel stocks have been exhausted.

One car builder recently refused an order for 100 cars, duplicates of those ordered by the same company recently. on the basis of the same price and delivery within 1923. This gives a definite indication of the condition of the market. From general knowledge of the situation, it seems timely to warn the railways that they will do well to plan considerably ahead on their new rolling stock requirements.

\$240,000,000 Is Conservative Estimate

As detailed in the Jan. 6 issue of ELECTRIC RAILWAY JOURNAL, the editors estimated that the electric railway inaustry would expend \$240,000,000 in new plant and equipment during 1923, as compared to the actual expenditure \$151,000,000 in 1922. In the few weeks since that time, the editors have had opportunity to discuss this estimate with numerous railway officials and have found that without exception they have felt that the estimate was very conservative. Recently one of the editors discussed the matter with the members of the committee on purchases and stores of the American Electric Railway Engineering Association during luncheon. There were present at this meeting a number of purchasing agents and engineers from various parts of the country. Not only did none of these men think that the estimate of expenditures was high, but nearly every one felt that, in view of the large expenditures his

Deliveries Lengthening in Car and own company was planning, the total for the industry must be much larger than \$240,000,000. Men from Indianapolis, Washington, Baltimore, Pittsburgh, Richmond and elsewhere spoke of expected large expenditures. The whole tone of the purchasing agents' meeting seemed highly optimistic and to foretell a very busy year for them. Recent visits of the editors to various properties have also brought out information of expected large expenditures in all departments.

Arthur W. Berresford Resigns

Arthur W. Berresford, vice-president of the Cutler-Hammer Manufacturing Company, has resigned after serving the company for twenty-two years. Mr. Berresford will in the future devote his time to work for the various associations of which he is a member. These include the American Institute of Electrical Engineers, American Association of Manufacturers of Electrical Supplies and others.

While "working for experience" he was connected with the Brooklyn railway system in carhouse work and line building. Later he became identified with the Riker Electric Company and the Ward Leonard Electric Company. In 1898 with two others Mr. Berresford purchased the assets of the Iron Clad Rheostat Company from the receiver

Metala-New York

and formed the Iron Clad Resistance Company, of which he became vicepresident and manager. In 1900 this company was purchased by the Cutler-Hammer Manufacturing Company and he then entered the engineering department of the latter concern. In 1901 he was made superintendent; in 1902 secretary; in 1905 general manager and in 1907 vice-president and general man-

Turbine Installation in New Haven

The Connecticut Company has ordered from the Westinghouse Company a 12,500-kva. turbine, to be installed in the railway company's power station on Grand Avenue, New Haven, known as Station A. The generator will generate 25 cycles three-phase, and the distribution will be at 11,000 volts. There will also be a 33,000-volt transmission line to Meriden, to which point power will be transmitted from New Haven.

To accommodate this turbine, the company is building a 36-ft. extension on the power station structure. It is expected that the turbine will be delivered in September. As an auxiliary the company will add a twin jet condenser with motor and turbine drive on each side.

Notable Achievements Win Recognition

Benjamin G. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., was presented the Joseph Sullivant medal by the Ohio State University.

Mr. Lamme, who was graduated from Ohio State in 1888, is the first person to receive the Joseph Sullivant medal. which will, in the future, be awarded

ELECTRIC RAILWAY MATERIAL PRICES-JAN. 30, 1923

MCCala Tich Lorn	
Copper, electrolytic, cents per lb. Lead, cents per lb. Nickel, cents per lb. Zinc, cents per lb. Zinc, cents per lb. Aluminum, 98 to 99 per cent, cents per lb. Babblit metal, warehouse, cents per lb.: Fair grade Commercial	15.00 8.07 27.50 7.35 40.25 22.50 42.00 25.00
Bituminous Coal	
Smokeless mine run, f.o.b. vessel, Hampton Roads	\$8.125 4.55 3.375 2.675 1.625 2.50
Track Materials-Pittsburgh	
	\$43.00 43.00 2.90 2.525 2.75 4.175 2.10 1.50
Hardware-Pittsburgh	
Wire nails, base per keg	2.75 3.35 4.35 3.35 2.45
Waste-New York	
Waste, wool, cents per lb. Waste, cotton, (100 lb. bale), cents per lb.: White. Colored.	12.00 11.5 9.5

Paints, Putty and Glass-New York 93.00 13.12 13.125 \$1.505

Paints, Putty and Glass—New Y
Linseed oil, (5 bbl. lots), cents per gal.
White lead, (100 lb. keg), cents per lb.
Turpentine, (bbl. lots), per gal.
Car window glass, (single strength), first three brackets, A quality, discount*...
Car window glass, (single strength), first three brackets, B quality, discount*...
Car window glass, (double strength, all eises, A quality), discount*...
Putty, 5 lb. tins, cents per lb.

*These prices are f.o.b. works, boxing charges extra. 84.0% 86.0%

Wire-New York Paving Materials

Paving stone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per sq.yd... Common, per sq.yd... Wood block paving 31, 16 treatment, N. Y., per sq.yd.

Paving brick, 3½ x 8½ x 4, N. Y. per 1,000 in carload lots.

Crushed etone, ½-in., carload lots, N. Y., 2.63 50.00 1.75

Cement, Chicago consumers het prices, with-	
out bags	2.05
Gravel, 1-in., ou.yd., N. Y.	2.00
Cond and MY	1.00
Sand, cu.yd., N. Y	1.00
Old Metals—New York	
Heavy copper, cents per lb	12.25
Light copper, cents per lb	10.87
Heavy brass, cents per lb	6.905
Zino, old scrap, cents per lb	4.625
Yellow brass, cents per lb (heavy)	
I enow orass, cents per to (neavy)	7.00
Lead, heavy, cents per lb	6.75
Steel car axles, Chicago, net ton	20.75
Old car wheels, Chicago, gross ton	27.25
Rails (short), Chicago, gross ton	23.25
Rails (relaying), Chicago, gross ton	
	33.50
Machine turnings, Chicago, net ton	12 75

once in every five years for "an admitedly notable achievement on the part of a son or daughter of the Ohio State University."

Mr. Lamme has been a prolific inventor. Most of the early rotary converter patents were in his name and he alone is the father of the 60-cycle converter. The single-phase railway motor, which was once said to be impossible, also stands to the credit of Mr. Lamme's genius. To turbo-generator design and all Westinghouse alternating-current apparatus, which are numbered among the greatest accomplishments in the electrical world, Mr. Lamme has contributed much.

Rolling Stock

Department of Street Railways, City of Detroit, Mich., it is understood, is considering the purchase of 100 new cars.

Muskegon Traction & Lighting Company, Muskegon, Mich., is planning to purchase five cars to be put into service during the next six months.

Pennsylvania-Ohio Electric Company, Youngstown, Ohio, is considering the purchase of ten or twelve cars, for use on one of its interurban lines, which will be as elaborately equipped and finished as a limousine.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has placed an order with the General American Car Company, Chicago, for fifteen gondolas, and with the Standard Steel Car Company, for twenty drop bottom cars.

Los Angeles (Calif.) Railway is planning to build its own cars. Eighty-two cars will be built this year in the new brick carpentry mill being erected at the South Park shops. Two motors of the latest type will be used on each car with equipment for multiple control so that two-car train service can be given. The cars will be 48 ft. long and will seat fifty-two passengers.

Springfield (Mass.) Street Railway suffered the loss of a carbouse and thirty-five open ears in a fire on Jan. 25. The estimated loss is \$300,000. All the cars that were burned were of double truck type. General Manager H. M. Flanders says that the company will not buy open cars to replace those destroyed. Whether an order would be placed for new closed cars he was not prepared to say.

Track and Roadway

Los Angeles (Calif.) Railway will soon start the reconstruction of East Ninth Street between Mateo Street and Santa Fé Avenue line. This improvement involves 700 ft. of work in which new girder rail will be installed.

Toronto, Canada—Improvements will be made to the three divisions of the Toronto & York Radials purchased by the city and operated by the Hydro Commission. The City Council recently approved of an issue of \$600,000 City of Toronto bonds for this purpose. Knoxville (Tenn.) Power & Light Company will lay a block of track on Walnut Street between Union and Clinch Avenues, and the special work at the intersection of this track with the Union and Clinch Avenue lines will probably be started in March. This improvement is designed to alleviate traffic congestion.

Power Houses, Shops and Buildings

Northwestern Elevated Railroad, Chicago, Ill., recently installed in its Wilson Avenue shop, a new 400-ton wheel press manufactured by the Niles-Bement-Pond Company.

United Railways & Electric Company, Baltimore, Md., will probably place an order before long for three or four automatic substations, including two 25-cycle, 1,500-kw. units in each station.

Public Service Corporation of New Jersey, Newark, N. J., through a subsidiary company has purchased a new building in Newark to provide for the company's needs due to its growth.

Moncton Tramways, Light & Power Company, Moncton, N. B., has negotiated a contract with the city of Moncton under the terms of which it will distribute the hydro-electric current in Moncton and suburbs.

Georgia Railway & Power Company, Atlanta, Ga., is constructing a new storage yard and carhouse near its present substation in East Point. According to the plans there will be thirteen tracks providing storage and repair room for sixty cars. The structure when completed will represent an expenditure of approximately \$40,000.

Trade Notes

Railway Switch & Crossing Company, Rutherford, N. J., has been incorporated at Trenton, N. J., with \$100,000 capital to deal in railway supplies. Guy L. Fake of Rutherford filed the papers.

United Traction Company, Albany, N. Y., has just placed an order with the Economy Electric Devices Company for 273 watt-hour meters equipped with car inspection dials. This will make a complete equipment for the city lines in Albany.

Omaha & Council Bluffs Street Railway, Omaha, Neb., has placed an order for 101 more Economy watt-hour meters for equipping another division. One division was equipped with eighty meters some time ago and this second order has been based upon the performance on the first division.

R. W. O. Taylor has been engaged as sales engineer by Nic Le Grand, Inc. Mr. Taylor has been connected with the rolling stock department of the Michigan Railway, where he has gained experience that should qualify him to present to the railways the merits of the safety devices and car parts manufac-

tured and sold by the Le Grand Company.

Frank Nickerson, for nine years connected with the San Francisco office of the Midvale-Cambria Steel Company, has severed his connections with that company to accept the position as southern California manager for the Bethlehem Steel Corporation. Recently he opened an office in the Washington Building, Los Angeles, Calif., for the Bethlehem Steel Corporation, covering all of southern California and the entire state of Arizona.

The Mine and Smelter Supply Company, with branches in Denver, Salt Lake City and El Paso, has taken over exclusive representation of the Wilson Welder & Metals Company for the states of Colorado, Utah, Nevada, Wyoming, New Mexico and Western Texas for Wilson plastic-arc welders and Wilson color-tipt welding metals. The Wilson machine and metals became internationally known during the World War, when it was used extensively in repairing the damage done to a large number of the interned German vessels. The mine & Smelter Supply Company will carry in stock at each of its branches a supply of all grades of Wilson color-tipt metals and plastic-arc machines for distribution throughout its territory.

Horace L. Howell, until recently connected with the National Railway Appliance Company, New York City, as manager of research and information in behalf of the London Underground Group and the London General Omnibus Company, is now associated with the Johnson Fare Box Company, Chicago, as sales manager and engineer. Mr. Howell has been engaged in transportation matters and electric power developments in the United States and Canada for a number of years. He has been connected with the Chicago City Railway, the Toronto Power & Railway Company, the Chicago Board of Supervising Engineers, and Weston & Company, Philadelphia. More recently he presented testimony in connection with the rate case of the Public Service Railway of New Jersey before the New Jersey Public Utilities Commission. Mr. Howell recently returned from England, where he was engaged in connection with the installation of fare collection devices in London. Mr. Howell was educated in England.

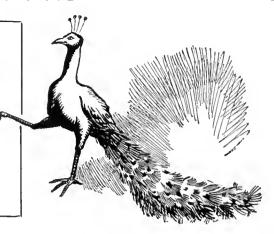
New Advertising Literature

Haskelite Manufacturing Company, Chicago, Ill., has issued a blueprinted booklet with diagrams entitled "Haskelite and Plymetl for Street Cars."

The Texas Company, 17 Battery Place, New York, N. Y., producers of Texaco petroleum products, has just issued a sixteen page booklet entitled "How Many Dollars Did You Spend This Year to Keep Your Cars Running?" This booklet treats of the costs and problems of street railway lubrication and gives figures and conclusions regarding their solution.

S - O - S When the Radio Makes Good!

Shipping laws wisely require that sea-going passenger vessels all have reliable radio apparatus. They may or may not ever use it for anything else, but in an emergency—it's there. Thousands of marine voyagers and sailors owe their lives to the presence of radio equipment with a man who could use it, when disaster has come upon some ship.



Peacock Brakes

are likewise "there" when the emergency arises

T may not be today, but some day sooner or later that inevitable combination of circumstances will occur when nothing but the best hand brake made, plus the ability of a motorman who understands and relies on it, will save you from a costly accident.

Peacock Brakes are the reliable kind—the kind of which it is said after the affair—"Peacock Brakes made good again."

Install Peacock Brakes and see that your men get acquainted with them. They will quickly learn to make the most of their unusually highbraking power and their extremely quick action.

Then you've got a combination of man and machine which you can count on to prevent accidents.



Peacock Improved Brake

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

Ford. Bacon & Davis

Business Established 1894

115 BROADWAY, New York

PHILADELPHIA

CHICAGO

SAN FRANCISCO

THE J. G. WHITE ENGINEERING CORPORATION

Engineers—Constructors

Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems

43 Exchange Place, New York

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OPERATING, TRAFFIC AND RATE INVESTIGATIONS SCHEDULES—CONSTRUCTION—VALUATIONS OPERATION—MANAGEMENT

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RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE
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CONSTRUCTION AND MANAGEMENT OF
ELFCTRIC RAILWAYS

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Chicago, Ill.

Philadelphia, Pa.

THE ARNOLD COMPANY

ENGINEERS-CONSTRUCTORS ELECTRICAL-CIVIL-MECHANICAL 105 South La Salle Street CHICAGO

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

SEPORTS-APPRAISALS-RATES-OPERATION-SERVICE

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management 683 Atlantic Ave., Boston, Mass.

J. N. DODD

614 Hall of Records, New York, N. Y.

Planning and Equipment of City Rapid Transit Lines Special Investigations

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

ROBERT M. FEUSTEL

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C. E. SMITH & CO.

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Investigations, Appraisals, Expert Testimony, Bridge and Structural Works, Electrification, Grade Crossing Elimination, Foundations, Power Plants

WALTER JACKSON

Consultant on Fares, Buses, Motor Trucks

Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.

143 Crary Ave., Mt. Vernon, N. Y.

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INVESTIGATIONS COVERING

on Management Operation 43 Cedar Street, New York City Reorganization Construction

Parsons, Klapp, Brinckerhoff & Douglas WM, BARCLAY PARSONS EUGENE KLAPP H. M. BRINKERHOFF W. J. DOUGLAS

Engineers—Constructors—Managers

Railway Light and Industrial Plants Hydro-electric Appraisals and Reports

CLEVELAND NEW YORK

THE COAL & IRON NATIONAL BANK of the City of New York

Capital \$1,500,000

Surplus \$1,000,000

Und. Profits \$363,051

Resources \$23,743,000

Offers to dealers every facility of a New York Clearing House Bank.

The Corporation Service Bureau

D. H. Boyle, President L. A. Christiansen, Vice President A. R. MeLean, General Manager

LABOR ADJUSTERS

Investigations-Inspections-Confessions

GENERAL OFFICES:

Suite 1215, Ulmer Building, Cleveland, Ohio

Dwight P. Robinson & Company

Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

125 East 46th Street, New York

Chicago Los Angeles Youngstown Montreal

Dallas Rio de Janeiro

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

PIQUA, OHIO



DAY & ZIMMERMANN. Inc.

Design, Construction Reports, Valuations, Management

NEW YORK PHILADELPHIA CHICAGO

Railroad and Tram Car Specialties

New inventions developed, perfected and worked for the English market

Messrs. G. D. Peters & Co., Ltd.

Windsor Works, Slough (Bucks), Eng.

THE P. EDWARD WISH SERVICE 50 Church St. NEW YORK

Street Railwoy Inspection DETECTIVES

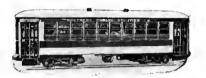
BOSTON

When writing the advertiser for information or prices, a mention of the Electrical Railway Journal would he appreciated.

Our Cars Cost Less To Maintain



Safety First







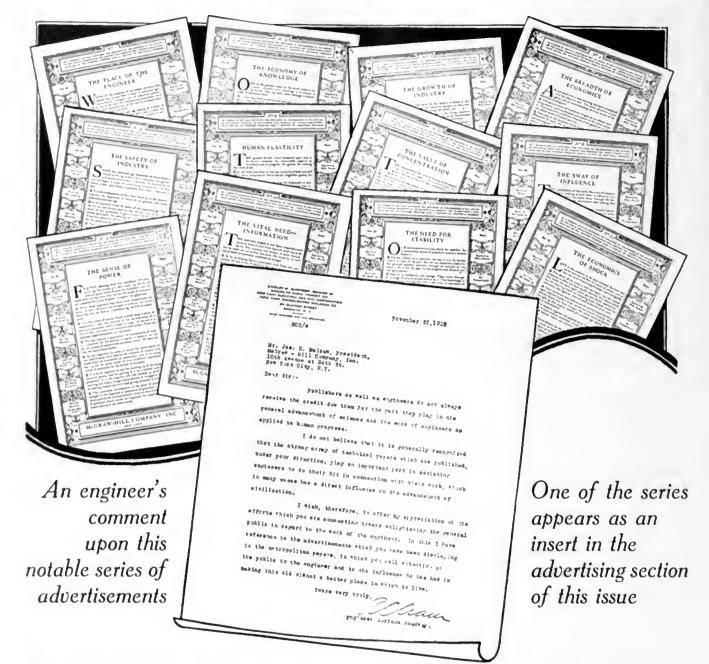
Cars of All Types From Birney One-Man Safety Large City and Interurban

SPECIALTIES

Sash, Doors, Interior Finish and Framing, Curtains, Ventilators and Car Trimmings, Brakes, Gongs, Door and Step Mechanism.

> "We Satisfy" Give Us A Trial

Perley A. Thomas Car Works High Point, N. C.



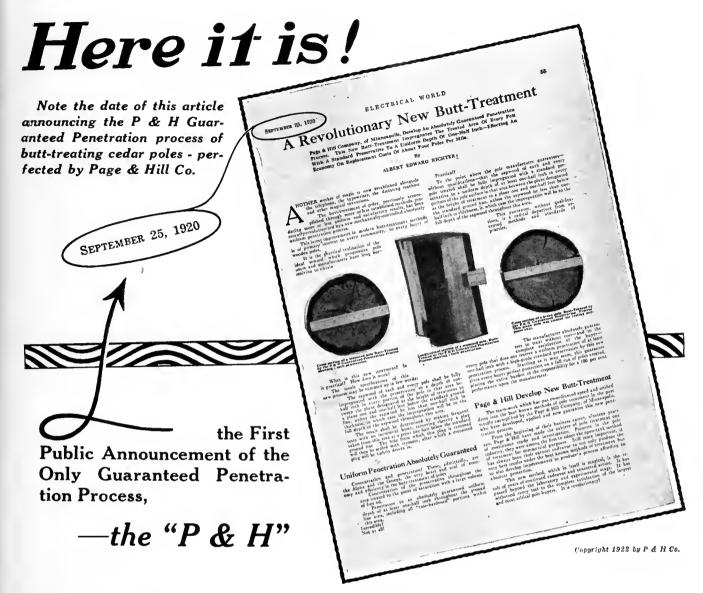
Picturing the Influence of the Engineer in the Affairs of the World

A series of twelve advertisements now appearing in McGraw-Hill publications

McGraw-Hill Company, Inc.

Tenth Avenue at 36th Street, New York

Publishers of Electrical Railway Journal, Electrical World, Power, Engineering and Mining Journal-Press, Engineering News-Record, Coal Age, Chemical and Metallurgical Engineering, American Machinist, Ingenieria Internacional, Industrial Engineer, Bus Transportation, Electrical Merchandising, Journal of Electricity and Western Industry, Pacific Mining News, McGraw Electric Railway Directory, McGraw Central Station Directory and Data Book.



DAGE & HILL CO. was the first to brand their poles-the first to develop a process of butt-treatment that insured a one half inch penetration of the preservative throughout the ground-line area of the pole-the first to issue a written guarantee specifying a definite depth of butt-treatment.

The "P & H" is the original Guaranteed Penetration Process-and is still the best. We guarantee, in writing, a half inch uniform penetration of the preserative throughout the ground-line area.

We produce and sell treated and untreated Northern White and Western Red Cedar Poles-we can give you any form of butt-treatment. We make prompt shipments because of the strategic location of our yards throughout the North Central and Western States.

Write for illustrated booklet of facts on the butt-treatment of cedar poles.

PAGE AND HILL CO. MINNEAPOLIS, MINN.

"Indianapolis" Welded Joints Meet All Requirements

Investigation of Welded Rail Joints

Metal-Electrode Arc-Welded Class Indianapolis "Apex" and "Simplex" Types

CONDUCTIVITY

U. S. Bureau of Standards (1913-1915), see Technologic Bulletin No. 62.

"Higher in Conductivity, thru Joint, than in the unbroken rail."

STRENGTH

Robert W. Hunt & Co. Testing Laboratories (1914-1916).

"Greater Strength and Less Deflection, thru Joint, than the unbroken rail."

ENDURANCE

Over 200 Properties (1912-1922). "Field Test, and actual service, thru Seasons, successfully resist severe traffic and temperature strains and stresses, as well as corrosion and electrolytic action." Joints "INTACT" after ten (10) years' severe service.



FAILURE OF WELDED TRACK

Not to exceed 1% of "Breakages," attributed to "Indianapolis" welded Joints, when applied in accordance with manufacturers' instructions. (Many report none (0%).)

ECONOMICAL

Cost less than Bolted Splices and Bonds.

AVAILABLE

Any road, any quantity, from one (1) to ten thousand (10,000).

UNIVERSAL

Any Rail Section, Suitable for paved streets.

DEPENDABLE

PROVEN, thru Ten (10) years, under varying conditions, in diversified territory (50 states and countries) over 200 properties, on over 125 different rail sections.



INDIANAPOLIS SWITCH AND FROG COMPANY
Springfield, Ohio





A NEW SERVICE They'll help you sell

A NEW SALES FORCE

Electric Railway Journal

MONTHLY MAINTENANCE ISSUE

(The Third Issue of Each Month)

1000 added readers

The maintenance men in the line, power, track and Use the Maintenance Monthly to sell these men. rolling stock departments will help you sell if you sell them on your service.

They handle your product and keep it in condition. Your reputation is largely in their hands.

Reserve a Page or a Spread

Next Issue February 24th

ELECTRIC RAILWAY JOURNAL, 10th Ave. at 36th St., New

Electric Railway Journal Readers

will spend over

\$400,000,000

For New Plant and Equipment, Materials and Supplies this year

This means big orders for manufacturers of such items as

Air Heceivers Ammeters Anchors, Guy Armature Shop Tools Automatic Switches Axle Straighteners Axles

Ayles
Babbitt Metal
Habbitting Devices
Habbitting Devices
Habitting Devices
Habitting Devices
Hatteries
Hearings
Holder
Holders
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Nus Seata

CO2 Recorders
Cables
Cambes
Carnas
Car Lighting Apparatus
Car Lighting Apparatus
Car Lighting Apparatus
Car Lighting Apparatus
Cars, Domp
Cars, Gas Hall
Cars, Passengar, Freight,
Express, etc.
Cratings
Cisteners and Retrievers,
Catenary Construction
Celling Car
chimneys
Chisels
Condensers
Compressors
Cressings
Creasing Signals
Creasing Signals
Crow Itars

Curtains Curtain Fiatures Cut Outs

Cut Outs
Derailing Switches
Destination Signs
Disinfectants
Dogs, Laths
Down Operating Devices
Boors and Door Firtuees
Boors, Folding Vestibula
Draft Rigging
Drill Presses
Brills, Rock
Drills, Track
Dryers, Sand

Earl Electric Grinders Electrodes Electric Wire and Cable Engineering Service Enginee Expansion Joints Extension Platform Trap Doors

Face Shields
Fare Boses
Feed Water Heaters
Fances
Fenders and Wheel Guards
Fibre
Field Colls
Floodlights
Flooring
Forgings
Frogs and 'trossings
Frogs. Track
Frogs. Troller
Furntiure, Office
Fuses and Fuse Boses

Gaskets
Gas Producers
Gasters, Car
Gasters, Car
Gear Hanks
Gear Cases
Gears and Pinions
Generating Sets
Generating Sets
Generating
G

Hesters, Cor Hydraulic Machinery

Instruments, Testing, Measuring, Hecording Insulsting, Machinery Insulating, Matterials insulators Insulation, Pins Insulation, Niot Insulation, Niot Insulation, Varnishes Insulation and Iron

Jacks Journal Boxes

Journal Boxes

Lamp Guards and Fixtures

Lampa

Lanterns

Lathe Attachments

Lathes

Lead

Leather Cloth

Leather Cloth

Leather Cloth

Leather Lather Lace Washers

Lane Material

Locomotives, Electric

Lock Washers

Lubricatin

Lubricants

Lumber

Machine Tools
Manguneso Steel Track Work
Metais
Meters, Car
Meters, Station
Mica
Milia
Milia
Motors
Motors
Motor and Genecator Sets

Nulla Note and Holts Nutlocks

Office Equipment Ohumeters Oils

Packing
Paint Guns
Paint Sprayers
Paint Sprayers
Parement Recakers
Paving Material
Pick Ases
Pickurs, Trolley Wire
Pinch Ravs
Pintons
Pintons
Piping
Pit Fittings
Piston Hings
Plates
Plates
Plates

Pliers
Pneumatic Tools
Pneumatic Tools
Pole Lino Hardware
Pole Heinforeing
Poles
Power Plant Equipment
Presses
Pressure Regulators
Pumps
Pumps, Vacuum
Punches, Ticket
Punching Machinery

Punches, Ticket Punching Machinery Rail Braces and Fastenings Rail Joints Rail Grinders

Halis Haliway Safety Switches Hali Welding Rattan Beclaimers, Oil and Waste Registers and Flittings Reinforcement, Concerte Repair Nock Heplaces, Car Resistance, Grid Resistance, Wire and Tube Resistance, Rheostata Hireters Hoofing, Car Roller Bearings Hoofing, Car Roller Bearings Hoofing, Car Roller Bearings Hoofing, Car Roller Bearings Hoofing

Sand
Sandpaper
Sanders
Sash
Sash Flatures
Screpes, Track
Screws
Screw Drivers
Scating Materials
Scats
Shades
Shades
Slank Adjusters
Viag
Sieck Wheels and Cutters
Smokestacks

Smokestacks
Snow Plows
Soldering and Brasing
Spikes
Spileirg Compounds
Spileirg Compounds
Spileirg Fonds
Spray Ponds
Springs
Strinkiers
Steam Separators
Steal
Steel and Steel Products
Stokers
Subway Boxes
Subway Boxes

Superheaters Sweepers Switches Switchboards Synchronoscopes

Tampers
Tappes, Insulating
Tappes and Cloth
Teceph were and Parts
Testing Devices
Thormostats
Theread Cutters
Tickets Choppers
Tickets and Transfers
Ticket Choppers
Tickets and Transfers
Tiles
Tio Rods
Tin
Tool Holders
Tool Steel
Tools
Transformers
Transformers
Transformers
Transformers
Transformers
Transformers
Transformers
Trolley Materials
Trolley Materials
Trolley Materials
Trolley Wheel
Trolley Wheel
Trolley Wheel
Trucks, Motor
Trucks, Motor
Trucks, Motor
Tubing
Turbines, Steam
Turnstiles
Turnstables

Vacuum Cleaners Valves Varnished Papers Varnished Silks Varnishes Ventilators Vises

Waste Saving Machines
Waste, Cotton
Waste, Cotton
Waste, Wrol
Wedder Strips
Welded Rail Jointa
Welders
Welding Stoel
Wheel Guards
Wheel Grinders
Wheel Presses
Wreels, Car
Wheels, Trolley
Whistles, Air
Wire Rope
Wire sad Cable
Wrenches

Zine

and many other items

If you want some of these orders, keep telling these readers why you should have them—

ELECTRIC RAILWAY JOURNAL.
Tenth Avenue at 36th Street, New York





Consider these painted panels. No. 2 is obviously neat and pleasing to the eye—yet only two tones are used. A simple color combination yields a striking effect!

Perhaps you are interested in planning a simpler effective color scheme for car painting? Let us work with you.



From the standpoint of selling transportation, much can be said for simple color schemes giving attractive effects. Handsomely finished cars create short-haul riders. Therefore it is essential that cars be kept fresh with that "new painted" look. Even an occasional shabby car produces an unfavorable impression.

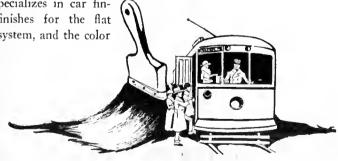
Simple color schemes permit low cost "brightening up" coats.

A complete line of finishes

The Beckwith-Chandler Company specializes in car finishes. Beckwith-Chandler makes finishes for the flat color and varnish system, the enamel system, and the color varnish system—everything needed

on the inside or outside of the car.

Beckwith-Chandler have long taken an interest in ways to help electric railways sell transportation. For this reason, we can offer practical co-operation in finishing—a real value to any electric railway.



Our reputation you probably know. If not, let us refer you to railway men who can speak for us.

BECKWITH-CHANDLER COMPANY

320 Fifth Avenue, New York

203 Emmett Street, Newark, N. J.

Laying Resilient ties in con traffic and without temporary crossovers



DAYTON

crete without interruption to

Think of having a permanent, easy-riding track on a permanent concrete foundation without interrupting service during construction and without the expense of temporary crossovers.

On the page opposite are shown city and interurban cars operating on a five- and thirty-minute headway, respectively, while dry concrete is being tamped under the ties.

The setting of unseasoned concrete is not, in any way, disturbed by the operation of the cars over it.

The asphalt cushion in the *resilient* tie absorbs the shocks so effectively that they do not reach the green concrete.

Tests have proved this construction sound. On other properties where this method was employed the concrete was found to be in perfectly good condition after 3 years of service.

Resilient ties are fundamentally and practically right, moreover, they permit of a saving of \$6000 a mile over wood ties laid in concrete. Ask for descriptive literature.

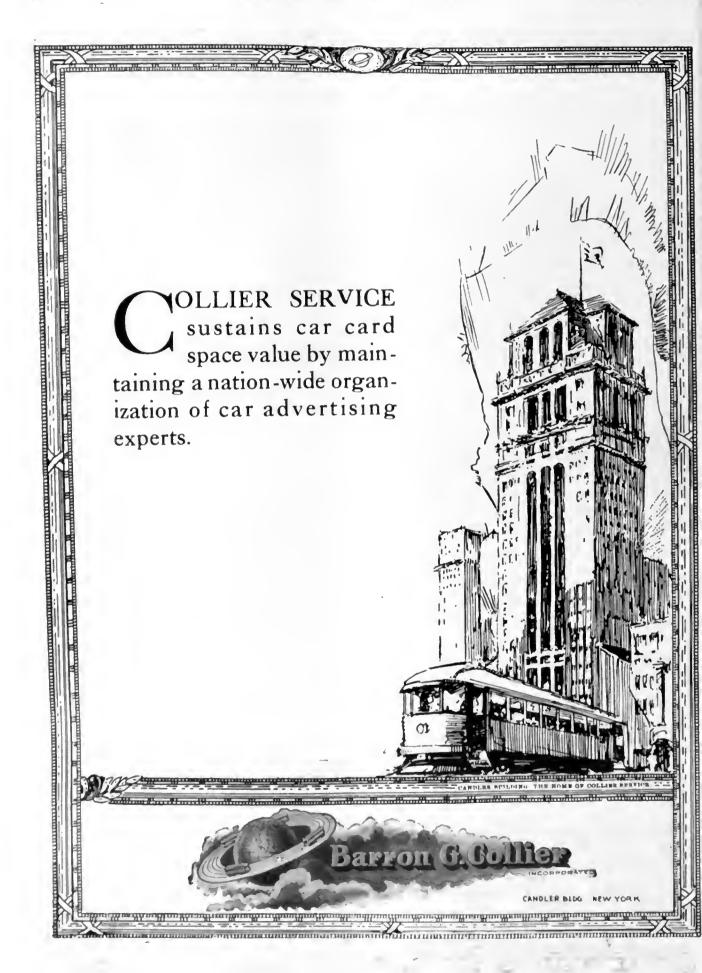
The Dayton Mechanical Tie Co.

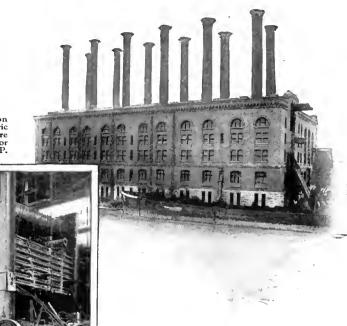
707 Commercial Building, Dayton, Ohio

Canadian Representative: Lyman Tube and Supply Co., Ltd., Montreal, Quebec



cushion the shock on the rolling stock





Commerce Street Station of the Milwaukee Electric Railway & Light Co., where there are 24 Edge Moor Boilers—total, 16,976 H.P.



LakesidePlantof the Milwaukee Electric Railway & Light Co. Here there are 8 Edge Moor Boilers with a total rating of 10,456 H. P. Note the 5drum, 4-pass boilers in the center illustra-



Power plant equipment that is selected for electric railway use is bound to be of proven worth, for the electric railways are among the most economical producers of power, as well as the largest. Electric railway operators cannot afford to experiment with untried apparatus, for the very life of their industry depends on economical and efficient power production.

Many of the most successful electric railway companies in the country have chosen Edge Moor Water Tube Boilers as standard equipment. Among this number is the big Milwaukee Electric Railway & Light Company, two of whose plants are here shown. This company ordered its first Edge Moor Boilers—five of 475 H.P. each for the Oneida Street plant—in 1898. This initial order was followed at intervals by twenty-two others, and the company now has 67 Edge Moor Boilers totaling 45,394 H.P. installed in seven different plants.

Significant evidence of the successful performance of Edge Moor equipment under the exacting conditions of electric railway operation!

Similar records from plants in a score of varied industries are included in the new Edge Moor Catalogue, now ready for distribution. Where shall we send your copy?

EDGE MOOR IRON COMPANY

Established 1868 EDGE MOOR, DELAWARE

EDGE MOOR, DELAWARE New York Pittsburgh Boston Charlotte Chicago St. Paul

FOR INCREASED FUEL ECONOMY



An Ohmer Fare Register for indicating and recording fourteen different fare classifications, as operated in a one-man car or motorbus.

OHMER Indicating and Recording

Registers

Fare

If you would sell your transportation at the least possible cost and with the least possible loss, you will do well to follow the example of the retail merchant from the largest department store down to the humble boot black. The indication and the registration of the amount paid is known to be essential to success in the business.

Ohmer Fare Registers indicate and record the exact amount and class of fare paid at the time it is paid.

Ohmer Fare Registers are made in a large number of types and sizes. They are adapted to electric railways, motorbuses and taxicabs.

OHMER
Fare Register Company
Dayton, Ohio



The No. 62 Detail Fare Printer. This register indicates and records fares from one cent in value up to \$9.99 and prints a detailed record of each sale.

THE THERMOSTAT IN THE GLASS CASE



Consider the Turnip

Not the garden variety but the heavy "armorclad" watch of grandfather's day. Metal encased, fore and aft, it was a formidable task to determine the time. Compare it with the delightful frankness of the present-day "openface."

Consider also the thermostat. Hitherto encased in metal, it hid, one knew not what, secrets beneath its cuirass. But now--

The CONSOLIDATED VISIBLE THERMOSTAT Keeps Nothing Under Cover'

It works right out in the open, where all who should may see. Enclosed in a durable tube of Pyrex glass, as well protected as though in the old type metal case, the thermometer tube is always in view.

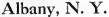
Far sturdier than it seems, the glass tube itself acts as a deterrent to the tamperer. It not only reveals the condition of the heating system; it betrays any attempt at damage, whether through ignorance or maliciousness.

Unusually sensitive and correct in its action, this new CONSOLIDATED VISIBLE THERMOSTAT is responsive to remarkably slight changes in temperature. It maintains uniform heat at minimum current consumption. The mounting gives complete stability and firmness, yet is resilient enough to absorb all the shocks and vibrations of street car service.

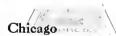
A good thermostat made better. Write for dztailed information or sample for inspection.



CONSOLIDATED CAR-HEATING CO.



11599982T 119





S. SAN FRANCISCO

CHICAGO



THERMIT INSERT RAIL WELDS

Ultimately the Cheapest Weld Even at Twice Its Price

A prominent Engineer of Way recently made the remark that if the THERMIT INSERT WELD cost as much as \$15.00, it would still be the cheapest rail joint on the market.

This is the opinion of an engineer who has used the process extensively for a period of over ten years and has many miles of THERMIT-welded track under his jurisdiction. The reason for his statement is, of course, the fact that the THERMIT INSERT WELD eliminates the cost of joint maintenance throughout the life of the rail, so that the first cost is the last cost, but the important point which we would like to emphasize, is the fact that the cost is no where near \$15.00. Many properties are making these welds

for less than one-half that figure, so that it is safe to say that the THERMIT INSERT WELD costs no more, on the average, than any other joint.

We do not like to talk price and would prefer to talk quality, but in the case of the THERMIT INSERT WELD price and quality go hand-inhand.

If you contemplate any track construction during the coming year, it will pay you to advise us of the approximate number of joints and the section number of the rail, and allow us to submit an estimate on the cost of eliminating your joints and prolonging the life of your track.

If you desire references and actual cost data, we can give it to you in abundance.

Metal & Thermit Corporation

120 Broadway, New York

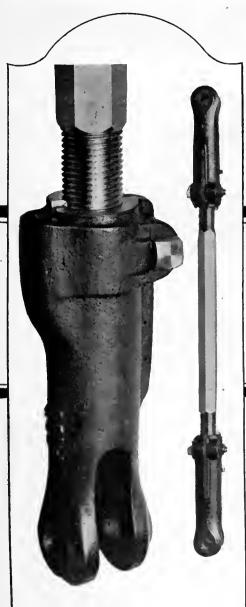
PITTSBURGH

CHICAGO

BOSTON

S. SAN FRANCISCO

TORONTO



The New Turnbuckle

Instead of a big coarse-threaded jam nut that needs a two-fisted wrench for application you require only a pocket-size wrench that is applied at a convenient angle. The secret? The jam-nut idea is replaced by a split clamp with a spring power that won't be loosened once the little nut on the side has been tightened.

This new turnbuckle will last as long as the truck, because—

It's Boyerized!



Heavy strains and sudden shocks mean little to "Boyerized" parts

"Boyerizing" leaves an armor-plated surface. Hard, Glossy. Enduring. The toughness of the steel is not impaired—it will withstand heavy strain and sudden shock. The armor-plate surface just prevents its wearing. Adds years of service. Lasts three or four times as long as ordinary untreated steel.

Other BOYERIZED Parts

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings

Spring Posts

Bolster and Transom
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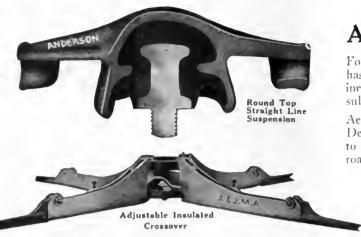
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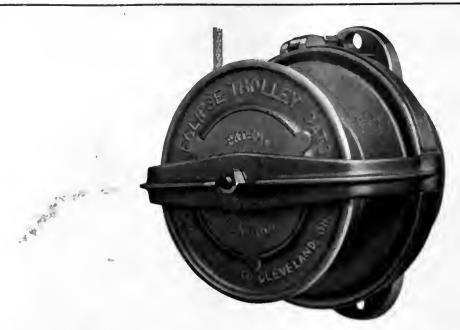
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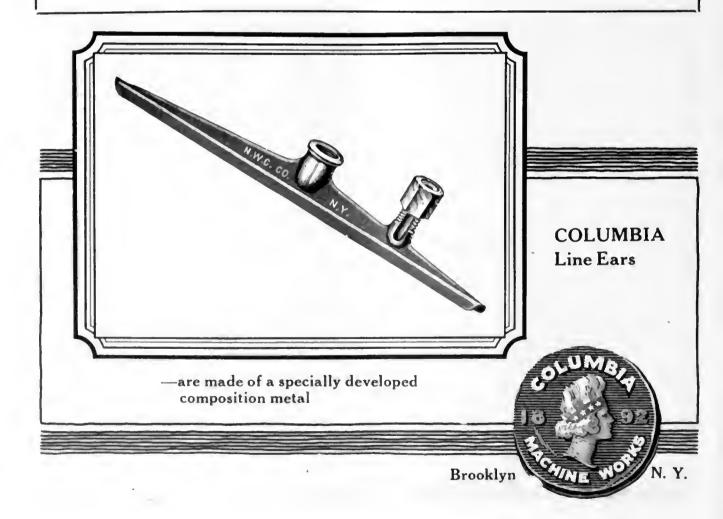
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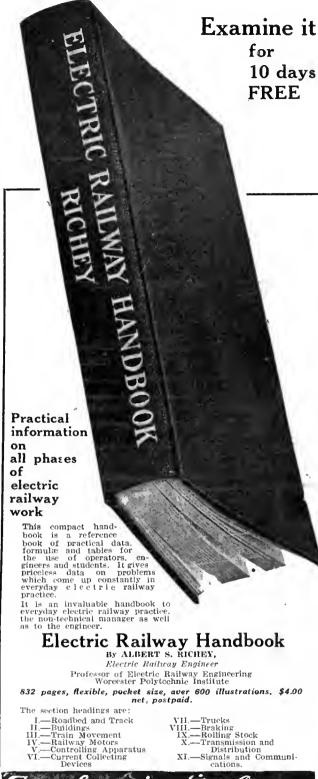


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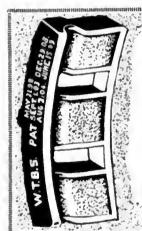
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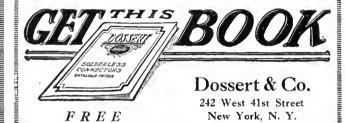


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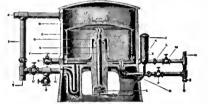
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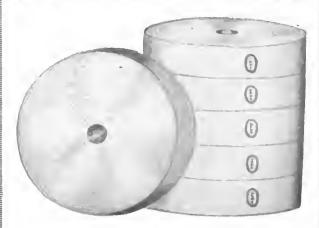
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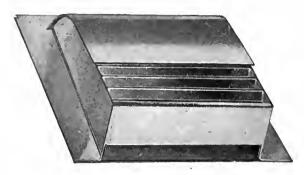
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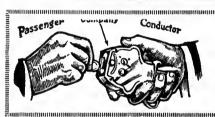
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Inspection Meters.
Lind Aluminum Firld Coll.
Tuol Steel Gears and Pinions
Anderson Sinok Adjustera
Geneesco Paint Gilis
Dunham Ropper Door Device
Frastlibe Brop Brake Staffs
Flaxilinum Insulation
It & W Electric Heaters
Angle-American Varnishes,
Paints, Enamels, Surfacers,
Shop Cleaner.
Thermo Paint & Oil Company's Cement Paint
"Syraense" Car Turnstilee.

E-Z Car Control Safety Device

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY Ravenswood, Chicago, Ill.

Fare Boxes

Change Carriers

COIN **SORTERS** COUNTERS

WRAPPERS

THE CLEVELAND FARE BOX CO.

CLEVELAND, OHIO

Canadian Branch, Preston, Ontario.



Gets Every Fare PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and

Perey Manufacturing Co., Inc. 30 Church Street, New York City

55 New Users in the Last 4 Months

KASS SAFETY TREADS present an Unusual Combination

in that they give BETTER RESULTS AT LESS COST Manufactured and Sold by

Morton Manufacturing Company, Chicago

See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREACHEAD ENGINEERING CO., CINCINNATI, O.

EARCHLIGHT

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED-RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance. Positions Vacant and all other classifications, 8 cents a word, minimum charge \$2.00. Proposals, 4C cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches......\$4.50 sn inch 4 to 7 inches.......4.30 an inch 8 to 14 inches......4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

POSITIONS VACANT

DRAFTSMAN wanted by a manufacturer of special track work in the East. Must be thoroughly familiar with designing and detailing both steam and street constructions. P-501, Electric Railway Journal, Real Estate Trust Bldg., Phila.,

POSITIONS WANTED

AUDITOR or assistant. Twenty years' experience in electric railway, light and power. At present employed, but desire to make a change. PW-507, Eiec. Ry. Journal, 10th Ave. at 36th St., New York City.

DIVISION superintendent, young, efficient, and progressive, desires position. Seven years experience. PW-513, Electric Railway Journal, 10th Ave. at 36th St.. New York City.

HIGH grade master mechanic, employed, desires change. 22½ years' experience. Live wire. Can produce results. PW-509, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campaigns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-499, Elec. Railway Journal, Leader-News Eldg., Cleveland, Ohio.

ASTER mechanic desires position on small city or interprisan property. I am at present employed and can give good references. PW-596, Elec. Ry, Jonrnal, Old Colony Bldg., Chicago, Ili. MASTER

MASTER mechanic desires position.
Twenty years' experience on city and interurban properties in shop work and maintenance of way. Good references, Central West or Western States preferred. PW-515, Electric Ry. Journal, Old Colony Bidg., Chicago, Ill.

SUPERINTENDENT of equipment. The American Machinist has just concluded a series of articles on "What's wrong with the railroad shops." From a production standpoint the electric railway shop is often in worse shape than the steam railroad shop. An equipment man who has recently worked out with his superlor an improved layout and production plan would like to place his application before managers requiring a superintendent of equipment. Age, middle thirlies. PW-511, Elec. Ry. Journal, Old Colony Bidg., Chicago, Iii.

TRAFFIC supervisor or chief clerk by young man with twelve years' experience as trainman, inspector, schedule and chief clerk, PW-503, Electric Rallway Journal, Leader-News Bldg., Cleveland.

POSITIONS WANTED

TO oversee welding, have been traveling welding engineer for Indianapolis Switch and Frog Co. for years. Wish to make cliange. PW-516, Electric Rallway Journal, Old Colony Bldg., Chicago, Ili.

WANTED position with Street Railway, have had more than twenty years' experience as superintendent transportation claim department and amusement parks. Good reference. PW-514, Electric Railway Journal, 10th Ave. at 36th St., New York City.

WANTED TO PURCHASE

LATHE

A good second-hand, at moderate price, large enough to turn down ear wheels 34 in, in diameter, Address.

II. D. HENDEE,
Asst. Supt. Burlington Traction Co..
Burlington, Vermont.

WANTED

3-K-35-D Controllers, complete. 1-Allis-Chalmers No. 302 Railway Armsture.

NORTHEAST OKLAHOMA R. R. CO. Miami, Okla.

FOR SALE

14-G. E. 210 Motors

TRANSIT EQUIPMENT COMPANY 501 Fifth Avenue, New York.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—6, E. No. 258-C Motors, K-12-H Control, West. Air Taylor Trucks, R.H. Type. Complete.

ELECTRIC EQUIPMENT OO.

Commonwealth Bidg., Philadelphia, Pa.

ELK.

POWER HOUSE EOUIPMENT

Complete Equipment **Embracing**

2-22 x 44 in. C. & G. Cooper Cross Comp. Corliss Engines, 845 H.P., 94 R.P.M., direct connected to G. E. 540 KW. Revolving Field Armatures, 3 phase, 370 volt, 845 amp. 4—300 H.P. B&W Water

Tube Boilers, which passed Ohio inspection when plant ceased operation.

Steam Driven Exciters, Rotary Converters, Transformers, Switchboard and equipment, Complete Water Softening Plant and all necessary equipment to make up fully equipped plant.

Equipment located Springfield, O. Inspection Invited

The Joseph Schonthal Co. Columbus, Ohio.

Wanted to Buy

Frequency Changer Set

25 cycles to 60 cycles 1000 kw.—1500 kw.—2000 kw.

State price, speed and voltages.

Albany Southern Railroad Company

James E. Hewes, Manager Rensselaer, N. Y.

SOME ONE WANTS TO BUY

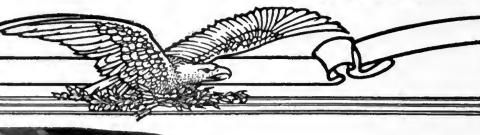
the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION IS HELPING OTHERS -LET IT HELP YOU ALSO

0079





WAR DEPARTMENT

FEBRUARY

Feb. 6th—Q. M. SUP-P L I E S—Fort Sam Houston, Tex., Auction. For catalog, write Q.M.S.O., Fort Sam Houston, Texas.

Feb. 9th—Q. M. SUP-PLIES—Chicago, III., Auction. For catalog. write Q.M.S.O., ISII West Pershing Road, Chicago, III.

0

Feb. 13th—Q. M. SUP-PLIES—Jeffersonville, Ind. Auction, Fur cat-alog write Q.M.S.O., 1810 West Pershing Road, Chicago, Ill.

Feb. 16th—Q. M. SUP-PLIES — Columbus. Ohlo. Auction. For cat-alog write Q.M.S.O.. 1819 West Pershing Road, Chicago, Ill.

Feb 20th—Q. M. SUP-PLIES—Philadelphia, Pa. Auction, For entaing write Q.M.S.O., 1st Ave. & 50th St., Brooklyn, N. Y.

ch. 23rd—Q M. SUP-PLIES — Schenectady, N. Y. Auction, For catalog write Q.M.S.O., 1st Avc. & 59th St. Brooklyn, N. Y.

SEND FOR CATALOG

SELLING PROGRAM

Feb. 27th—Q. M. SUP-PLIES—Boston, Mass. Auction, For catalog write C.O., Q.M. Inter-nicilate Depot, Boston, Mass.

Peb. 28th—ORD, SUP-PLIES — Watertown, Mass. Auction. For catalog write C.O., Bos-tom Dist. Ord. Salvage Board, Watertown, Mass.

MARCH

(These sales dates sub-ject to change)

March 1st—Army Base
—Port Newark, N. J.
Sealed Bid. For proposal write Quartermaster General. Room
2024, Monitions Bidg.,
Washington, D. C.

March 6th—Q. M. SUP-PLIES — Brooklyn. N. Y. Auction. For cata-log write Q.M.S.O. 1st Ave. & 50th St., Brook-lyn. N. Y.

The Government reserves the right to reject any or all bids.

SEND FOR CATALOG

FOLLOW UP TO PRODUCTION DEPT

Due SEP 14 1922 Overdue Ten Dry

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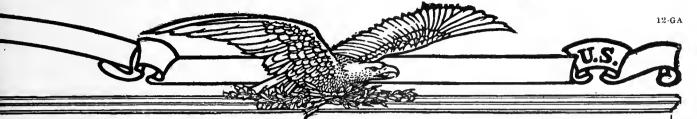
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Signature R Tool Foreman must fill out, sign and return to Routing Dept.

AT ONCE

February 3, 1923
Electric Railway Journal





"Until We Get That Material~"

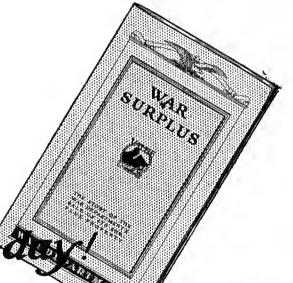
—in the meantime production waits: an experience that few plants have escaped. And idle machines are profit eaters.

That is why the War Department Sales are proving such a boon to so many manufacturers. For it is not alone in the financial savings that their attraction lies, but in the knowledge that you're going to get what you've bought just as soon as you need it.

These sales are going on constantly, and if you're not following their announcement in your industrial or daily paper you are missing opportunities that can never again be duplicated.

Just have your clerk watch for them, route them through the various departments and, when you strike something you need, send for the catalog. A few moments so invested may yield rich dividends. Write to Major J. L. Frink, Chief, Sales Promotion Section, Office of Director of Sales, Room 2515, Munitions Bldg., Washington, D. C.

Write for this Booklet to-



1RTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car Collier, Inc., Barron G. Air Receivers, Aftercoolers Ingersoll-hand Co. Ammeters Roller-Smith Co.

Anchore, Guy Electric Service Supplies Co. Ohio Brass Co. Washinghouse Elec. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand Ramapo Ajax Corp.

Antomatle Safety Switch Stande Ramapo Ajax Corp.

Axie Straighteners Columbia M. W. & M. I. Co. Axies, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegre Steel Co
Taylor Electric Truck Co
Westinghouse Elec. & M. (

Babbitt Metal Ajax Metal Co More-Jones B. & M. Co.

Babhitting Devices Columbia M. W. & M. I. Co.

Hadges and Buttons
Electric Service Supplies Co.,
International Register Co.,
The

Bankers and Brokers Coal & Iron National Bank

Batteries, Dry National Carbon Co. Nichols-Lintern Co.

Nichols-Lintern Co.

Bearloge and Bearing Metals
Ajax Metal Co.
Bennis Car Truck Co.
Columbis M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons B. F. Co.
Le Grand, Inc., Nic.
More-Junes Br. & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Servines Conter and Relies

Bearings, Center and Roller Stucki Co., A. Bearings, Roller Stafford Roller Bearing Car Truck Co.

Belle and Gonga
Brill Co., The J. G.
Columbia M. W. & M. J. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co. Benders, Rail Ry. Track-work Co.

Beliers

Babcock & Wilcox Co., The
Edge Moor Iron Co.

Beller Tuhes Edge Moor frou Co.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Rail Welding & Bonding Co.

Bonding Apparatus
Amer. Steel & Wira Co.
Elec. Ry. Imp. Co.
Indianapolis Switch & Frog

Co. Chin Brass Co. Rallway Track-work Co. Rail Welding & Bonding Co.

Renda, Rali
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co. Ohio Brass Co. Railway Track-Work Co. Rail Welding & Bonding Co. Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, (See also a union, etc.)
Baiss Exp Steel Truss Co.
Creaghesd Eng Co.
Elec. Ry Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer, Brake Shoe & Fdry,
Co. Barbour Stockwell Co. Bemis Car Truck Co.

Brill Co., The J. G. Columbia M. W. & M. I. Co. Taylor Electric Truck Co. Wheel Truing Brake Shoe

Co.

Hrakes, Brake Systems and
Brake Parts
Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Broome, Track, Steel and Rattan Amer. Rattan & Reed Mfg. Co.

Hrushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
Westinghouse Elec. & M. Co.

Brushes, Geaphite National Carbon Co.

Brush Holders
Anderson Mig. Co., A. &
J. M. Columbia M. W. & M. I. Co.

Brushes, Wire Pneamatic Ingersoll-Rand Co.

Buses, Motor Brill Co., The J. G.

Bushings, Case Hardened and Manganese Bemis Car Truck Co. Brill Co., The J. G.

Cables (See Wires and Cables)

Cambric Tapes, Yellow & Black Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Apparatus Elec. Service Supplies

Car Panel Safety Switches Consolidated Car Heating Co, Westinghouse Elec. & M. Co.

Care, Dump Differential Steel Car Co.,

Care, Passenger Freight Care, Passenger Freight
Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire Cummings Mig.
Co.
National Ry Appliance Co.
Perley A.
Thomas Car Works,
Wason Mig. Co.

Care, Second Hand Electric Equipment Co.

Cars, Self-Propelled General Electric Co

Castings, Brass, Composition or Copper Alax Metal Co. Anderson Mfg. Co., A & J. M. J. M. Columbia M. W. & M. I. Co. More-Jones Br. & Matal Co.

Castinge, Funnel Wharton, Jr., & Co., Inc.

Castings, Gray Iron and Steel Bemis Car Truck Co. Columbia M. W. & M. I. Co. Wharton Jr. & Co., Inc., Wm.

Cartings, Malleable and Brass Amee, Brake Shoe & Fdry, Co. Co.
Bemle Cer Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Inc. Nic

Catchers and Retrievers atchers and Ketrievers
Trolley
Earll, C. 1.
Echipse Railway Supply Co.
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chss. N.

Catenary Construction Archbold-Brady Co.

Circuit Breakers General Electric Co. Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables Crossings Ramspo Ajax Corp.

J. M.

Cross Arms, (See Brackets) Fences, Woven Wire and Fence Posts Amer. Steel & Wire Co.

J. M. Dossert & Co. Electric Railway Equip. Co. Elec. Service Supplies Co. General Electric Co. Hubbard & Co. Westinghouse Elec. & M. Co.

Cleaners and Serapers, Track (See also Snow-Plows, Sweepers and Brooms) Brill Co., The J. G. Ohio Brass Co.

Cinsters and Sockets General Electric Co.

Coal and Ash Handling (See Conveying and Hoist-ing Machinery)

Coli Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co. Colls, Armsture and Field Columbis M. W. & M. I. Co. General Electric Co. Rome Wire Co. Westinghouse Elec, & M. Co.

Colls, Choke and Kicking Electric Service Supplies Co. General Electric Co. Westinghouse Elec. & M. Co.

Coin-Counting Machines International Register Co. Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices General Electric Co. Commutators or Parts
Cameron Elec'l Mig. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air
Alia-Chalmera Mig. Co.
General Electric Co.
Ingersoll-Band Co.
Westinghnuse Tr. Br. Co.

Compressors, Air Portable Ingersoll-Rand Co. Compressors, Gas Ingersoll-Rand Co.

Condensers
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.

Condensor Papers Irvington Varnish & Ins. Co. Conduits, Underground Std. Underground Cable Co. Connectors, Solderless Dossert & Co. Westinghouse Elec. & M.,Co.

Connectors, Trailer Car Consolidated Car Heating Co, Elec, Service Supplies Co. Ohio Brass Co.

Controllers or Parts Columbia M. W. & M. I. Co. General Electric Co. Westinghouse Elec. & M. Co.

Controller Regulators
Electric Service Supplies Co. Controlling Systems General Electric Co. Westinghouse Elec. & M. Co.

Converters, Rotary General Electric Co. Westinghnuse Elec. & M. Co.

Conveying and Huleting Machinery Columbia M. W. & M. I. Co.

Cooling Systems Spray Engineering Co

Copper Wire Anaconda Copper Mining Co. Cord, Bell, Trolley, Register,

ete.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co.,
The Roeblings Sons Co., John A. Samson Cordage Works

Cord Connectors and Complexs Electric Service Supplies Co. Samson Cordage Works Wood Co., Chas. N.

Complete, Car Brill Co., The, J. G. Ohio Brass Co. Westinghouse Tr. Br. Co.

Crossing Foundations International Steel Tie Co. Crossing Frogs and Switches Ramapo Ajax Corp. Wharton, Jr., & Co., Inc., Wm.

Crossings, Manganese Indianapolis Switch & Frog Ramapo Ajax Corn.

Crossing Signals. (See Signals, Crossing) Crossings, Track. (See Track, Special Work)

Crossings, Trolley Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The, J. G.
Electric Service Supplies Co.
Murton Mfg. Co.

Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co. Derailing Switches, Tee Rall Ramapo Ajax Corp.

Destination Signs
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Service Supplies Co.

Detective Service Wish Service, P. Edward Door Operating Devices

Consolidated Car Heating
Co.

Co. National Pneumatic Co., Inc. Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The, J. G.
General Electric Co.
Salety Car Devices Co.

Doors, Folding Vestibule National Pneumatic Co., Draft Rigging. (See Couplers)

Drills, Rock Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohin Brass Co.

Dryers, Sand Electric Service Supplies Co.

Ears Ohio Brass Co. Electric Grinders Railway Track Work Co. Electrodes, Carbon Indianapolis Switch & Frag

Railway Track Work Co. Electrodes, Steel Indianapolis Switch & Frog

Co. Railway Track Work Co. Electrical Wires and Cables American Elec. Works Boeblings Sons Co., J. A.

Emergency Kits First Aid Specialty Co.

First Aid Specialty Co.
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Archbold-Brady Co.
Arnold Co., The
Beeler John A.
Day & Zimnerman, Inc.
Dodd, J. N.
Drum & Co., A. L.
Frustel, Robert M.
Ford, liacon & Davis
Hemphili & Wells
Holst, Engelbardt W.
Jackson, Waller
Ong, Joe B.
Parsons, Rispp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Smith & Co., C. E.
Stone & Wabsier
Esgince, Gas. Oil and Steam

Engines, Gas, Oil and Steam Ingersoll-Rand Co. Westinghouse Elec. & M. Co.

Expansion Joints, Track Wharton Jr., & Co., Inc., Wm.

Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

Fenders and Wheel Gnards
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Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
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Le trand, Ne. Nic
Star Brass Works

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Frogs, Track. (See Track Work)

Frogs, Trolley Ohio Brass Co.

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Gas-Electric Cars General Electric Co.

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Westinghouse Elec. & M. Co.

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Genr Blanks Carnegie Steel Co.

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Westinghouse Elec. & M. Co.

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Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
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General Electric Co.
Nat'l Ry. Appliance Co.
Nuttail Co., R. D.
Tool Steel Gear & Pining Co.

Generating Sets. Gas-Electric General Electric Co.

Generators
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General Electric Co.
Westinghouse Elec. & M. Co.

Goggles, Safety Indianapolis Switch & Frog

Gongs (See Bells and Gongs) Graphite
Morganite Brush Co.

(See Lubricants) Greates. Grinders and Grinding Supplice Indianapolie Switch & Froz

Cn.
Mctal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable Railway Track Work Co.

Grinders, Portable Electric Railway Track Work Co.

Grinding Blocks and Wheels Railway Track-work Co. Seymaur Rail Grinder Co., E. P.

Guard Rail Clamps Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese Ramapo Ajax Corp.

e Sup. Co.

Guards, Trolley Electric Service Ohlo Brass Co. Hammers, Pasumat Ingersoll-Rand Co. "THEY'RE FORGED—NOT CAST THAT'S WHY THEY LAST"

and the control of th

(No Alloy)

TROLLEY WHEELS

Full mileage in the wheel without abrasion on the wire—real economy

Send for Particulars

THE COPPER PRODUCTS FORGING CO.

1412 East 47th Street, CLEVELAND

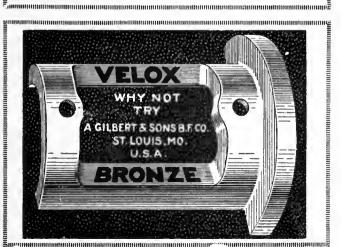


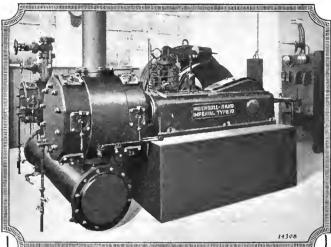
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS KALAMAZOO, MICH., U. S. A.





Compressor Efficiency At Full and Partial Loads

With the 5-Step Clearance Control

Be sure your air compressor will perform reliably and that its regulation will give you efficient performance at full and partial loads.

This latter is extremely important because the demand for air is seldom steady. Although maximum full load compressor efficiency is necessary, high economy at underloads is even more important.

Probably the outstanding cause for the success of Ingersoll-Rand direct-connected electric motor-driven compressors is their 5-Step CLEAR-ANCE CONTROL. With this regulation the compressor automatically operates at any one of five load points, depending upon the demand for air. The compressor will deliver full, three-quarter, one-half, one-quarter or none of its capacity, and the horsepower required is practically in proportion to the air output.

Send for Complete Information

Ingersoll-Rand Company 11 Broadway, New York

Birmingham Boston Butte Chicago Cleveland Denver

Detroit Dufuth Dallas El Paso Houghton Jonlin Juneau Knoxville Los Angeles New Orleans New York Philadelphia l'ittsburgh Salt Lake City San Francisco Scranton Seattle St. Louis



Harps, Trolley
Anderson M. Co., A. & J. M.
Bayooet Trolley Harp Co.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttail Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.

Henters, Car (Ele Consolidated Ca Co. Economy Electric Devices Co. Gold Car Reating & Lighting Co.
Nat'l Ry, Appliance Co.
Smith Heater Co., Peter Hesters, Caz, Hot Alr and Water

Electric Service Sup. Co. Smith Heater Co., Peter Itelmets, Welding Indianapolis Switch & Frog Co. Railway Track-Work Co.

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General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
Westinghouse Tr. Br. Co.

Insulating Machinery Amer, Ins. Machinery Co.

Insulating Silk Irvington Varnish & Ins. Co.

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Co.
Roebling's Sons, Co., J. A.
Rome Wire Co.
Westinghouse Elec. & M. Co.

ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
.\	Dayton Mechanical Tie Co34, 35		- K
Ackley Brake & Supply Corp 61	Differential Steel Car Co., The. 21	Jackson, Walter	Railway Track-work Co 1
Alax Metal Co	Dodd, J. N	Jeandron, W. J	Rallway Utility Co 6-
Allis-Chalmers Mfg. Co 50	Dossert & Co	Johnson Fare Bax Cu 56	Rail Welding & Bonding Co 16 Ramapo Ajax Corp 5
Allison Co., J. E	Drum & Co., A. L	К	Richey, Albert S
Amer. Brake Shoe & Fdy. Co 63 American Car Co	E		Robinson & Co., Dwight P 9
American Electrical Works 51		Kuhlman Car Co 65	Roebling's Sons Co., John A 51
American Invulating Machinery	Earll, C. 1		Rome Wire Co
Co	Eclipse Railway Supply Co 48 Economy Electric Devices Co 15	1,	Rooke Automatic Register Co 5!
American Rattan & Reed Mfg.	Edgemoor Iron Co	Lapp Insulator Co., Inc 52	
Co	Electric Equipment Co 57	Le Carbone Co	S
American Steel & Wire Co 52	Electric Ry, Equipment Co 12	Le Grand, Inc., Nic 55	Safety Car Devices Co
Anaconda Copper Mining Co 51	Elec. Ry. Improvement Co 52	M	Samson Cordage Works 64
Anchor Webbing Co 52	Electric Service Supplies Co 11	M	Sanderson & Porter 26
Anderson Mig. Co., A. & J. M., 44	English Electric Co A	McGraw-Hill Book Co 49	Searchlight Section 57
Archbold-Brady Co		McGuire Cummings Mfg. Co 22	Smith & Co., C. E 20
Arnold Co., The	F	Marsh & MeLennan 6	Smith Heater Co., Peter 53
Assn. of Mfrs. of Chilled Car	· Feustel, Robt. M 26	Metal & Thermit Corp 40	Spray Engineering Co 5- Stafford Roller Bearing Car
Wheels 43	First Aid Specialty Co 56	Miller Trolley Shoe Co Front Cover	Truck Co
FE .	Flood City Mfg. Co 52	More-Jones Brass Metal Co 42	Standard Underground Cable Co. 51
Babeoek & Wilcox Co 53	Ford, Bacon & Davis 26	Morton Mig. Co	Star Brass Works 61
Baldwin Locomotive Wks 44	Ford Chain Block Co 04		Sione & Websier 26
Barbour-Stockwell Co 53	"For Sale" Ads 57	N	Stucki Co., A 53
Bates Expanded Steel Truss Co., 18	G	Nachod Signal Co 47	
Bayonet Trolley Harp Co 45		Nashville Tie Co	T
Beckwith-Chandler Co 33	Galena-Signal Oil Co	National Brake Co	Taylor Electric Truck Co 4"
Beeler, John A 28	General Electric Co 20, 24, B. C	National Carbon Co 63	Thomas Car Works, Perley A 27
Bemis Car Truck Co 41	Gilbert & Sons, B. F. Co., A 61	National Pneumatic Co., Inc 13	Thurnton Trolley Wheel Co
Bonney Vehslage Tool Co 55	Globe Ticket Co	National By. Appliance Co 56	Tool Steel Gear & Pinton Co 41
Brill Co. The J G 65	Gold Car Heating & Lig. Co 55	New York Switch & Crossing Co. 52	Transil Equip. Co
Buckeye Jack Mfg. Co 53	H	Niehols-Lintern Co 55	Turnstile Car Corp 50
C	"Help Wanted" Ads 57	Nuttall Co., R. D 17	U
Cameron Electric Mfg Co 53	Hemphill & Wells		Union Switch & Signal Co 19
Carnegie Steel Co	Heywood-Wakefield Co 54	U	U. S. Electric Signal Co 45
Cleveland Fare Box Co 56	Holst, Englehard W 26	Ohio Brass Co 7	Universal Lubricating Co 53
Coal & Iron Nat. Bank 27	Hope Wehbing Co 54	Ohmer Fare Register Co 38	
Collier Inc. Barron G 34	Hubbard & Co 51	Oil & Waste Saving Machine Co. 53	W
Columbia, M. W. & M. I. Co 48	Indianapolia Switch & Frog Co. 30	Ong, Joe R	"Want" Ada 57
Consolidated Car Fender Co 64	Ingersoll-Rand Co	h	War Department58,59
Consolidated Car Heating Co 39		A'	Wason Mig. Co 65
Copper Products Forking Co dl		Page & Hill	Westinghouse Elec. & Mig. Co :
Corporation Service Bureau, The 27	International Creosoting & Con-	Parsons, Klapp, Brinckerhoff &	West'gh'se Traction Brake Co 4
Creaghead Engineering Co 50	struction Co	Douglas	Wharton, Jr., & Co., Wm 5
D	International Register Co., The., 56 International Steel Tie Co., The., 9	Percy Mig. Co., Inc	Wheel Truing Brake Shoe Co 56
Day & Zimnierman, Inc	International Steel Tie Co., The. D	Peters & Co	White Eng. Corp., The J. O 2d
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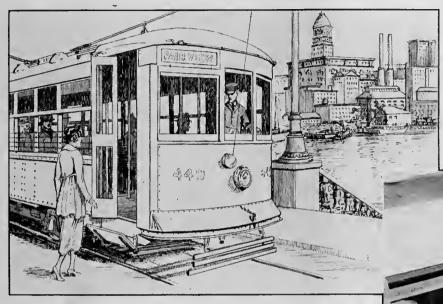
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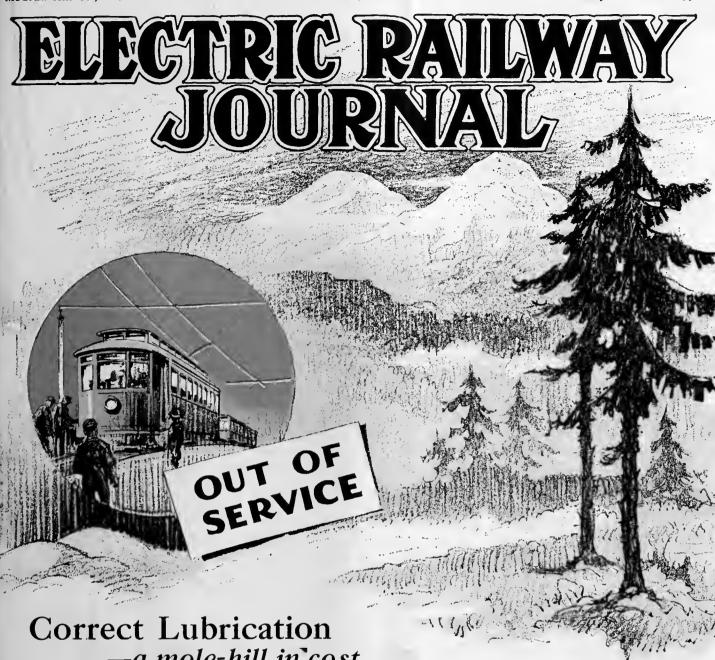
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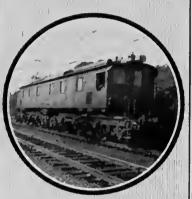
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The Pennsylvania type is particularly noteworthy, having in view the possibility of a single type of locomotive for both main-line passenger service in the New York Terminal, and for freight service similar to the Altoona grade.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.





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CONTENTS

Points of Interest About the Capital Traction Company. . 235 BY R. H. DALGLEISH,

A general idea of the physical characteristics of the property are given, together with interesting information on some of the construction and maintenance practices.

New Repair Shops at Boston......239

Boston Elevated Railway is spending \$5,000,000 for new shop facilities. How the work will be routed through the various departments, which are so arranged as to keep the travel of heavy parts to a printing. parts to a minimum.

Better Service Possible in Richmond......243

In Mr. Beeler's report on organization and service, it tells how, through the co-operation of the city, and the company, electric rallway service in Richmond, Va., can be speeded up and other improvements made.

Toronto System Worth Nearly \$12,000,000......247

Two arbitrators in the long-drawn-out Toronto ease, render decision for this amount. City appointee disagrees. The case will probably he appealed to the Privy Council.

Successful Interurban Radio Reception.................249 The Readers' Forum......250

Association News and Discussions.......251

Maintenance of Equipment......254

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Reading the M.M.I.

A^T A RECENT convention we are invited into the room of a well-known railway track engineer. During the course of our visit he proceeds to extract a paper from his brief case. In so doing he finds it necessary to remove a copy of the JOURNAL.

"You see, I carry the JOURNAL right with me," Sam remarks.

"But does its presence there mean anything?" we query.

"It means," he assures us, "that I have to use all my spare moments and then some to read everything."

"Fine," we think, "Sam is a man who knows the value of keeping up with progress and appreciates the job we are doing in gathering and broadcasting information to the field."

A little later we wander into the hotel lobby and shake hands with Henry, a master mechanic of recognized ability on a large property.

"You remember that article I wrote some time back on equipment maintenance, don't you?" he inquires.

"Certainly I do," we answer, "It was a fine piece of work, Henry."

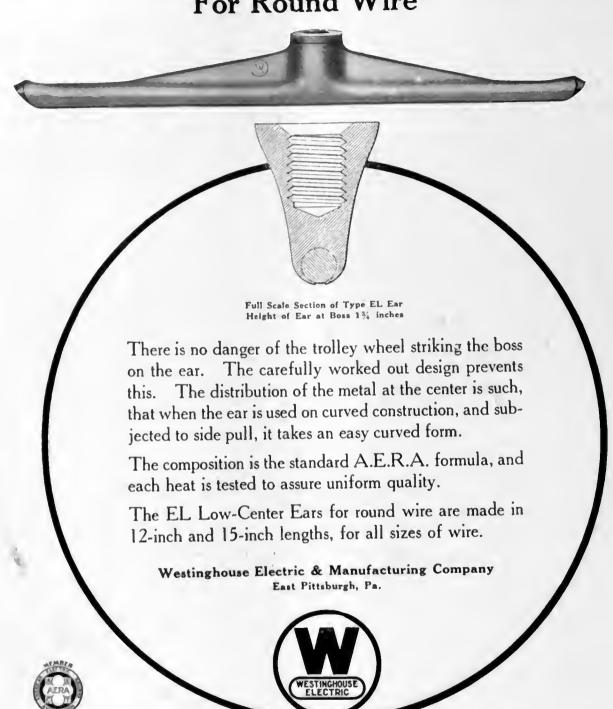
"Well," he continues, "five different master mechanics here today have mentioned that article and one of them told me he had it copied from the JOURNAL for distribution among his shop foremen."

It is such statements as these that we commonly hear that confirm our judgment of the paper's worth. But, wait, didn't he say one of these men had to have the article copied for his foremen? Evidently that man has not yet appreciated that these foremen should all receive the JOURNAL—at least the Monthly Maintenance Issue which is devoted almost entirely to the practical problems that are of direct help to them in their own everyday work.

Take note of the next M.M.I. (Feb. 24) and see how close it is to the problems of your foremen and then make sure that they receive and read it regularly.

A Serviceable Ear

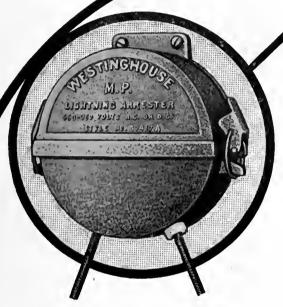
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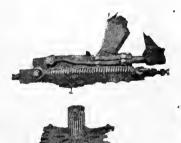
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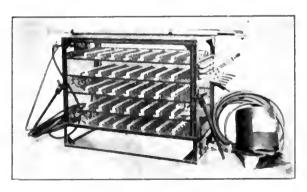
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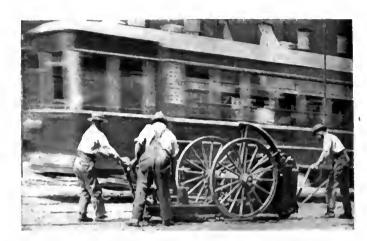


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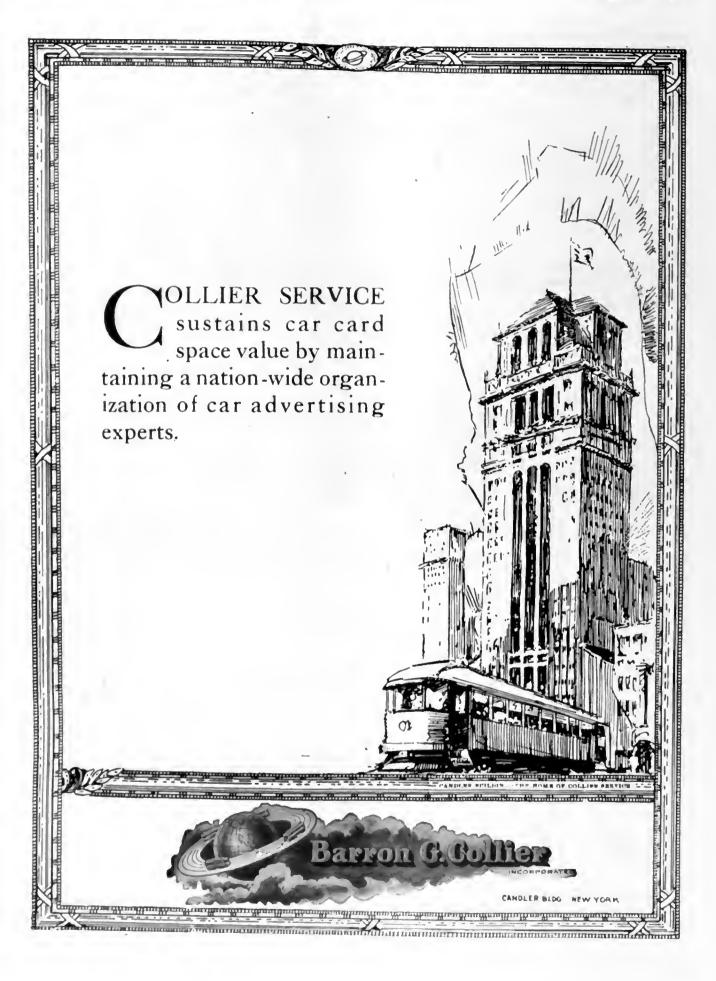
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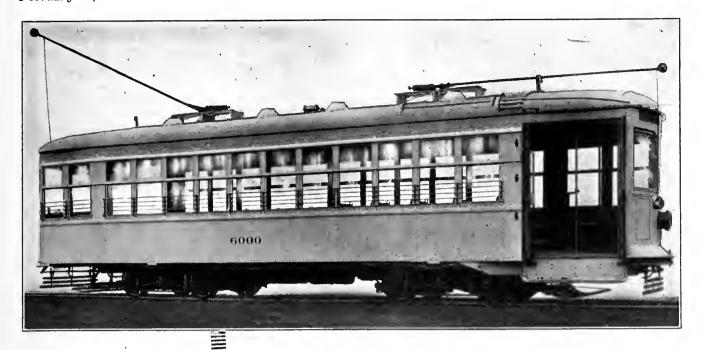
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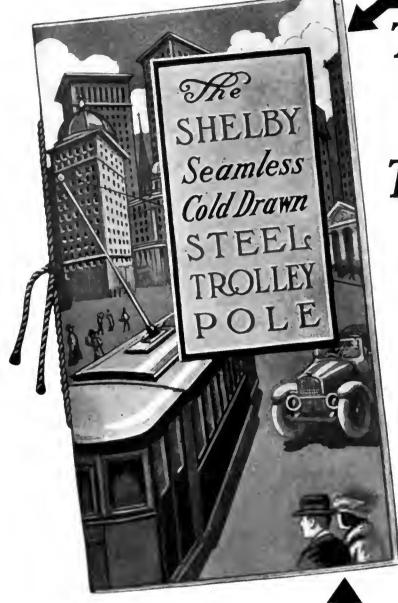
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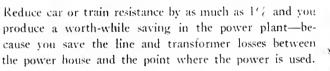
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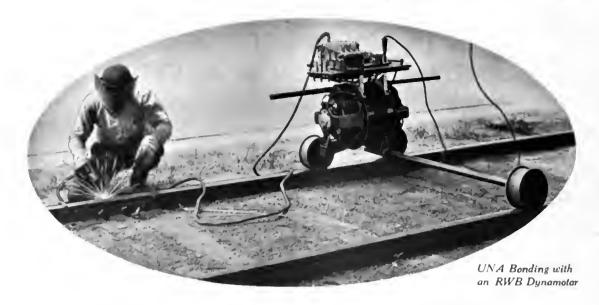


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welder of sufficient capacity. UNA Metal in this case is the electrode instead of carbon and the arc is drawn between it and the bond. The heat of the arc actually melts the UNA Metal electrode and fills up the mold making the finished bond just the same as obtained with the carbon arc.

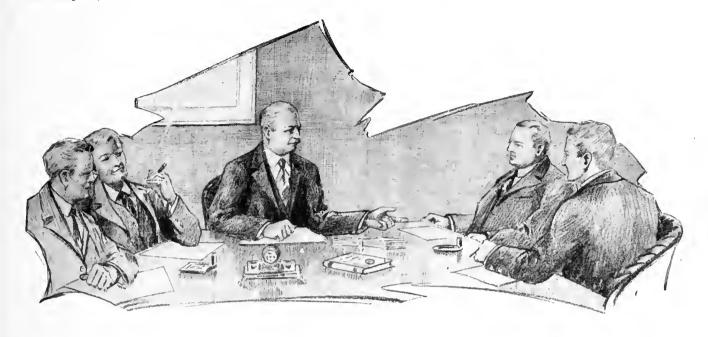
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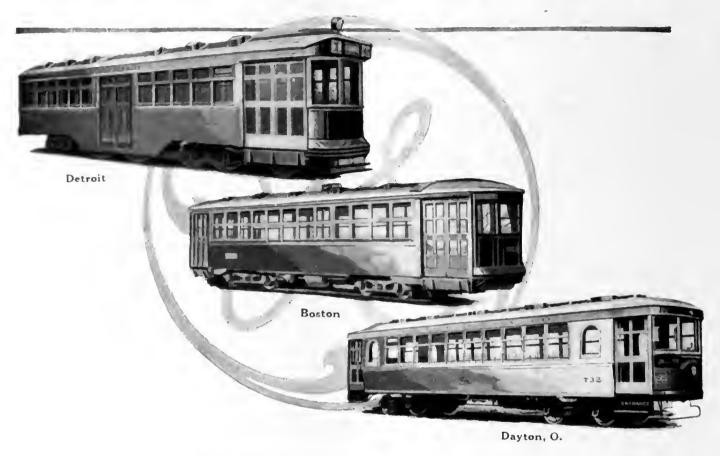
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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 61

New York, Saturday, February 10, 1923

Number 6

Last Call for Midyear Conference

THE midyear conference of the American Electric Railway Association stands out as an event second only in importance and magnitude in the electric railway industry to the annual convention. This year the program arranged and the speakers selected are such that it behooves every executive who can possibly get away from his regular duties to be in attendance in order to get the spirit of the meeting and carry away with him its full value.

The morning session is to be devoted to the subject of taxation, one of the particular burdens of the electric railways, because much of their share of taxation This will be treated primarily by is inequitable. Senator Davenport, who has come to be recognized as one of the eminent authorities of the country on the subject. The advent of the motor truck and motor bus have raised new problems in the field of taxation, on which Mr. Davenport has probably made the most exhaustive study yet made public. Another session will be devoted to the subject of regulation, of even greater import to the electric railway field. On this subject, again, the conference is to be addressed by the man who may be considered the most eminent authority in his field, as he stands at the head of the regulatory profession as president of the National Association of Public Utility Commissioners.

Both these subjects will be discussed from all angles by men selected for their particular ability along the lines of the topic. Then there will be the banquet, which, with the Secretary of the Interior, the former Vice-President of the United States and a prominent railway executive as speakers, should be in itself a great attraction. Some seventeen committee meetings, arranged for on Feb. 15 and 16, will call others to Washington. Altogether, the outlook and reservations to date indicate an attendance of 800 or more.

Traffic Studies Are Instructive to All

ONE of the most valuable portions of electric railway literature is that embodied in traffic survey reports and other studies of ways of improving operating conditions in different cities. These studies are sometimes carried out by an official of the railway company or by some member of the staff of the regulating commission, but more often they are made by an outside engineer or staff of engineers engaged to do this work by the company, the commission or the city in which the system is located.

Unfortunately for the industry, complete copies of these reports are rarely available for all who are interested in the subject of economical electric railway operation. While there is nothing secret in regard to their contents, the conditions under which they are produced bring about this scarcity. They are usually part of a public record and there is not enough popular demand for any individual report to warrant its being printed and placed on sale through the bookstores like a commercial book. In fact, most of these reports are not even printed. Enough copies are mimeographed to supply a copy to members of the City Council, the officials of the railway company concerned and the newspapers in the city in which the survey was made, with perhaps a few over. Even with those more ambitious reports which are put in book form, not many more copies are printed. Nevertheless, as stated, progress in thought in the electric railway industry, particularly in regard to transportation methods, often first finds expression in these reports.

It is because of the realization of this condition that the ELECTRIC RAILWAY JOURNAL has always given extended treatment to reports of this kind. Its editors realize that the primary aim of a report of this kind is the solution of the local problem to which it is devoted. Nevertheless, they feel that through the methods of approach adopted for these local problems managers of electric railway properties can often derive helpful information and suggestions as to how they can best administer their own properties. For this reason rather extended abstracts have been published of practically all pertinent studies.

The Saving of Patrons' Time Is the Main Object

In the report on Richmond service, by John A. Beeler, the significant statement appears that: "Any street car system has as its main object the saving of time for the patrons." With this as a basis, the report goes on to show how time can be saved to a greater extent than at present by improved methods of fare collection, better destination signs, less frequent stops for passengers, more regular headways, the introduction of electrically operated switches instead of switches moved by hand, and so on. All of these methods save the time of the patron and so are of benefit to him.

Of course the definition of the objects of an electric railway might be made much longer than the expression of the five words in the caption at the top of this editorial. The stockholders will think the enterprise a failure if it does not show a profit. Good service to the passenger, also, implies his safe transportation and a certain degree of comfort, but in a sense these are understood to be accompaniments of any system of transportation. Experience with jitney competition, however, shows that a considerable number of people are willing to put speed above either comfort or safety.

The extent to which a railway company is also interested in increasing the speed of its cars is shown by the figure given in the Richmond report of 5 cents as being the cost of each minute lost by each car, and that

the saving of but a minute on each trip of a car would amount in a year to \$100,000. Presumably a two-man car was being considered. Five cents a minute corresponds, of course, to \$3 a car-hour, and as the saving includes not only the platform cost but a certain amount of the investment in both cars and carhouses, it will be admitted that the estimate is by no means high. Yet there are many nickels in this form lost on the average electric railway. If each schedule maker could realize that nickels at the rate of one a minute are dropping from each car during every unnecessary delay without doing good to anybody, he would pay more attention to seeing that the stream of nickels was diverted from the street to the treasury of the company.

But it should be remembered that the schedule maker alone can do little. He must receive the support of the transportation department to the extent that the schedules which he prepares are actually made and not that they simply appear in the time-table. Cars must be kept to these schedules, not behind nor ahead of time.

An Impetus to Chicago's Electrification and Terminal Problem

RECENTLY the group of railroads using the Dearborn Street Station in Chicago made public a proposed plan for a magnificent new terminal project on the present site to serve as a consolidation of the three stations located just to the south of Chicago's loop—the Dearborn, La Salle and Harrison Street stations. This plan was designed by the same engineer-architect who laid out the Grand Central Terminal in New York City. The Chicago project is an even greater one. While this plan is only one of several similar studies that are being made, its presentation to the public portrays such a great practical improvement that it must surely serve as a great impetus to the execution of some such plan.

This particular plan has merits which very logically must form elements of any alternative proposal. It is close to the Loop district (two blocks south of Van Buren Street), but far enough removed so that there is available, without undue cost, plenty of ground for making ample provision for pedestrian and vehicular movements. It contemplates the opening up of Dearborn Street, which now ends at the present terminal, by a two-part, two-level traffic way extending through the terminal to the south. It would open up to a wonderful development all the air rights, by virtue of electrification, over the area now occupied only by tracks, and result in a tremendous increase in property values to the south of the Loop district. It would also effectively break down the imaginary barrier to expansion to the south of the "iron-bound loop," just as this barrier disappeared on the north with the construction of the Drake Hotel.

The possibilities in civic improvement, in property enhancement and in advantages to the railroads and the traveling public are so great that they appeal to all concerned. In addition to the development of the immediate neighborhood of the new terminal, the plan would release a very large proportion of the territory south of Van Buren Street between State Street and the river, which is now largely occupied by railroad tracks, or whose presence make the remaining area undesirable for any high-grade use. With the Illinois Central and Union Stations now under way completed, and this proposed Dearborn Street development carried out, Chicago's terminal project would be well solved.

The Toronto Valuation Was a Notable One

ONE of the most extended arbitration proceedings ever conducted to determine the value of an electric railway has just been finished in Toronto. Hearings were begun June 28, 1921, and it was not until Jan. 30, 1922, that the arbitrators appointed to determine the price to be paid by the city for the trolley system, which it took over on Aug. 31, 1921, handed down their decision. During this time the board worked assiduously, as is shown by the immense volume of testimony taken, which amounts to about 5,000,000 words, the equivalent of thousands of typewritten pages.

In one way the work of the arbitrators was simplified, or perhaps it was complicated, by the fact that the original agreement between the company and the city, made some thirty-one years ago, specified the basis on which the valuation should be made. The arbitrators did not have, therefore, to decide what valuation method to adopt, but they did have to construe the meaning of certain terms which were the subject of dispute between the city and the company. Perhaps the most important of these questions was what was meant by the expression "a railway of the best kind and system then in operation" as applicable to service in Toronto. The arbitrators also had to decide what part of the property of the company "was necessary to be used in the working of the railways at the termination of the said period of thirty years." It also had to determine the time at which the prices for materials valued should

This latter question might seem at first easy to answer by taking the time when the railway was taken over, namely, Aug. 31, 1921. But the great variation in prices which occurred during the period 1918 to 1922 made this matter of date very important, and there was no direct reference to it in the original agreement. The company's counsel put up an able plea for 1919 and 1920 prices, on the theory that if the city had been obliged to construct a railway system, it would have had to begin three years earlier than Sept. 1, 1921, to be in as good a position as it was on that date. Such a plan would have led to a higher value than 1921. On the other hand, the city's attorney urged the adoption of such a price schedule as he claimed would have prevailed if there had been no war. These figures obviously were much lower than those of Sept. 1, 1921. The arbitration board answered both of these arguments by saying that "so far as the principle of reproduction cost, less depreciation, is availed of, it must be a reproduction cost at the time of the arbitration."

Allowances for organization and legal expenses, going-plant value, etc., while admitted by the board to have a place in some valuations, were ruled out by the simple statement that the words in the agreement and authorizing statute declared that the payment should be for "actual and tangible property" only.

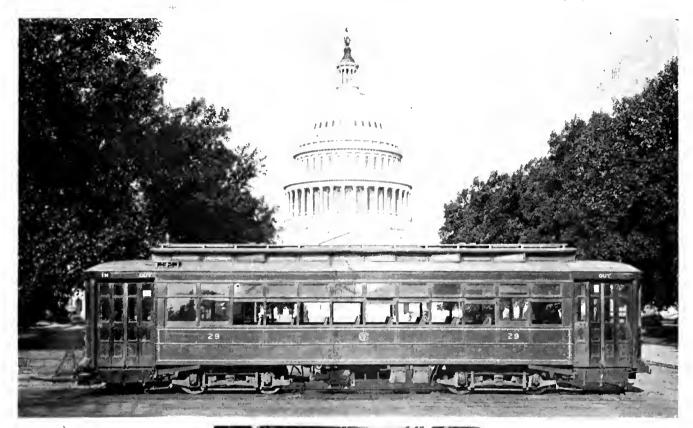
While press reports from Toronto say that the decision may be appealed by the city to the London Privy Council, the work of the arbitrators is a notable one. It helps establish the principle in British possessions, and to some extent in all English-speaking countries, of the reproduction cost, less depreciation, method of valuation, based on prices current at the time of the arbitration. It also points to the desirability in any agreement of this kind of anticipating in advance, so far as is possible, all kinds of questions which may come up and providing for them in the agreement.

Points of Interest About the Capital Traction Company

By R. H. Dalgleish

Chief Engineer Capital Traction Company, Washington, D. C.

A General Idea of the Physical Characteristics of the Property Are Given, Together with Interesting Information on Some of the Construction and Maintenance Practices



HE Capital Traction Company furnishes transportation in the city of Washington to approximately 70,000,000 passengers yearly. It has 69.4 miles of single track. The schedule speed for the system is 10.25 m.p.h. between terminals. The longest run is made by the Chevy Chase cars, which run from Chevy Chase Lake to Seventh Street Wharf, a distance of 10.31 miles. On 20.9 miles of single track the power is collected from an overhead trolley and on 48.5 miles the power is collected from the

conductor rails located in the conduit below the track

The use of the conduit system adds very materially
to the construction and maintenance costs and makes

operation more difficult. The illustration on page 237 shows a cross-section of the running rails, conduit, etc. Cast-iron yokes spaced 4 ft. 6 in. and set in concrete,



Latest Type Car Purchased by the Capital Traction Company

support the running rails and slot rails. The insulators supporting the conductors are hung from the slot rails.

Fig. 3 on page 236 shows a photograph of a contact plow. Two parallel bars fastened to the truck engage in the slots in the top of the plow. These bars are parallel to the axles so that the plow is free to move sideways. It is guided entirely by the slot rail and the conductors. Since the slot is only \(\frac{3}{2}\) in, wide the plow is limited to a \(\frac{5}{2}\)-in, piece. In this \(\frac{5}{2}\) in, the two leads must be carried down to

the shoes and kept well insulated, and the plow must be strong mechanically. Thus it is seen that the design of a satisfactory plow is not simple. The plow is removed from the truck at openings in the slot rail which permit it to be rotated so that it disengages from the truck. The leads are connected to the car wiring by plug and

Features of Capital Traction Construction and Maintenance







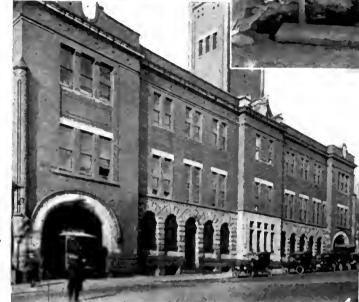


Fig. $1 \rightarrow \Lambda$ hand truck carrying a controller and resistance is used in movering car trucks under their own power

Fig. 2—Tunning axle bearing shell

Fig. 3—Plow used with underground conduit, showing leads and contact shoe.

Fig 4—Georgetown carhouse and general office building.

Fig. 5—New conduit track ready for concreting.

Fig. 6—Hand pressing armature bearings in the housings.





socket connectors so that the plow may be easily removed from the truck at any point where slot hatches are provided for the purpose. The contact shoe is insulated from the spring so that when an arc is drawn between the shoe and contact rail it will tend to break from the castiron shoe rather than to jump to the spring and burn it.

At the corners where the plow comes in contact with the slot rail, 18 in. thick spring steel hardened wearing plates are added. These must be replaced frequently, especially during wet weather, due to the grinding action of grit.

An idea of the life of the plows may be gained from the fact that during the past year 400 new plows were built and 3,777 were repaired, or a total average of 13.4 plows per car in service per year. During the year 1922, of all delays to service of two minutes or over, 44 per cent were attributed to the conduit system. Table I shows that the cost of maintaining plows for 1922 was 0.12 cent per car-mile, or 62 per cent as much as the cost of maintaining the motors.

The type and number of cars in operation is shown in Table II. In addition to this equipment there are also twenty-one open thirteen-bench cars equipped with Westinghouse 101-B motors. These cars are not in operation at present. All the cars are of the two-man pay-as-you-enter type except the open cars and one car equipped with safety features for one-man operation. The latter is used on an outlying line. In addition to the passenger equipment the company has the following service equipment: Eleven snow sweepers, five sand cars, one instruction car (shop), six dump cars and two work cars.

The illustrations at the head of this article show exterior and interior views of the latest type of cars purchased. The cars purchased in 1920 were equipped with four Westinghouse 514-C motors using $7\frac{1}{2}$ deg. helical gears. These gears have made approximately 125,000 miles with practically no wear. The cars are noticeably quieter than cars equipped with spur gears. As a result of the operation of these gears and previous experimental sets, all replacements of worn-out gears are of helical design.

The cars are operated from five carhouses located as follows:

Name of Carhouse	Location	Number of Cars
Georgetown Seventh Street. Fourteenth Street Chevy Chase. Navy Yard	Thirty-sixth and M Streets Water and P Street, N. W. Fourteenth and Decatur Chevy Chase Lake Eighth and M Streets, S. E.	82 56 67 16 97
Total		318

Every effort is made to keep the cars in first-class condition by systematic inspection and overhaul. Light inspections only are made at the five carhouses, all overhauling being made at the main shops located at Thirty-second and M Streets, N.W. Definite rules are laid down for lubricating the car equipment in the form of a lubrication chart shown as Table III. Prior to use of this chart each oiler used his own judgment and the

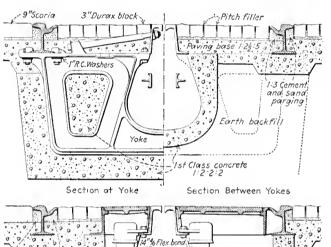
TABLE I—COMPARATIVE MAINTENANCE EXPENSE IN CENTS PER CAR-MILE FOR YEARS 1921 AND 1922

Painting and varnishing Body repairs Truck repairs Air brake equipment Overhauling and carhouse work	1921 0.260 0.398 0.542 0.057 0.103	1922 0.253 0.352 0.504 0.055 0.108
Total cost bodies, truck, etc. Car motors. Miscellaneous power apparatus. Repairs to plow. Overhauling and carhouse work.	1 360 0.195 0 103 0 152 0.172	1, 272 0, 194 0, 086 0, 120 0, 172
Total electrical equipment Other expense* Total equipment mintenance expense	0.622 0.248 2.230	0.572 0.262 2.106

^{*} Including superintendence, shop expense, vehicle and service equipment maintenance.

results were far from satisfactory. Now, with definite rules laid down, the operation is largely removed from the judgment of the oiler and the results since the adoption of this chart have been very satisfactory.

The cars and equipment are thoroughly overhauled on



Section at Handhole and Manhole

Sectional Drawings of the Washington Conduit Track Construction

a 40,000-mile basis. At this time the bodies are removed and put on temporary trucks and moved to the body repair shop and painted or varnished, depending upon their condition. The motors are removed from the trucks and opened up and thoroughly cleaned. The armatures are dipped and baked and the bearings are inspected and replaced if necessary. All bearings are pressed into housings as shown in Fig. 6. Any bearing which goes in too easily is rejected. This press is also used for all miscellaneous work where relatively small pressures are required.

Fig. 2 shows the babbitting and tinning equipment. Two furnaces are used, one to heat the babbitt metal and the other for tinning the bearing shells. All malleable iron bearing shells are tinned before babbitting.

			FABLE II	-CAR E	QUIPMENT OF	THE CAPIT	AL TRAC	TION C					
Number of Cars	Motors per Car	Truck	Weight, Lb.	Seating Capacity	Length Over Bumpers	Motor	Total Motors	Gear Ratio	$\widetilde{\text{Pitch}}^{\text{G}}$	Type	New Wheel	Pony Wheel	Control
20	4	Standard 0-50 Standard 0-50		44 44	43 ft. 8 in. 43 ft. 8 in.	$W-101B_2 \\ G.E. 200C$	80 20	18/66 16/65	3	Spur Spur	33		K29B K29B
40 20	4	Brill 77E l Brill 77E l	41,000 45,000	48 48	43 ft. 111 in. 43 ft. 111 in.	W514-C G.E. 247D	160 80	15/76 15/63 15/69	31/2	Helical Spur	31 31	21 in. outside	K40AR ₂ K66A ₂ K27
43 39 50	2 2	Brill 39E Standard 0-45 Brill 39E	33,000 36,000 33,000	40 40 40	41 ft. 42 ft. 41 ft.	W101B W306 W306	86 78 100	14/70 14/70	3	Spur Spur Spur	31 31	21 in. inside 21 in. outside	K27 K27

sand paraina

					4.5	Armature Bearings	Not	Motor Axle Bearings	Journal	- E	Gears	p 5	Compressors		Winders y finders	Niste	N.C. m.n.a.	Bearings	Bratines	Trothy F.	Fredby Equipment	Controllers
	Ty	Type of Equipment	patroner	*	7.50	Lubricant Galeta Elec. Car Oil	Calen	Labricant Galena Elec. Car Off	Lubricant Galena Elec Car Oll	- Dat	Lubricant Casiena Compound	Def.	Lubricant Galena Air Comp. Oil		Lubricant Galena Air Brake Comp.	Lubricant Cent Plate Grease	Lubricant Gal Brake Valve Oil	Cent. Plate Grease	Cent Plate Greuse	Cumpressur Oil	Lubricant	Lubricant
Car Numbers	Trucks	Motorn	Gontrob.	riomanimo')	Prequency	Surarity per Bearine	Exaduency	postus. Grapiti, per	Pre- Qua	Quantity Pr.F. Bearing	Prequency.	Gown Der	Frequency.	Compressor		Frequency		Englumer	Englency	nt-roctn	Вими	
2	So of sant until consumation	WH 101B K GE 290	7 : 1: 1 : 1 : 1 : 1 : 1: 1: 1: 1: 1: 1:	25 25 25 25 25 25 25 25 25 25 25 25 25 2	18 Day	WH 101B K 29 D2 EQ IS Days Will be Well 13 Days GHI CE 200 No. 10 No. 10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 : 1: 1 : 1 : 1 : 1 : 1: 1: 1	Repacking as follows—April and October: On all olty cars I's mooths On all olty cars I's mooths All old waste to be removed from journal boxes and replaced with property soaked and alranged		90 Sugar	25 :	Fill to within 15 in . of top of filling obow	teness do betseledit od ot stability oderd if t	Overbauling period. The cylinders are covered with a thin coating of Galena Air brake Compound, Air brake Compound in a this manner. All platen deathers to be treated with the coating of capital and a thin to be treated with the coating of the c	At each 15-day inspection period all brake sides and richerlon points are to be thoroughly research with Center Place grease. The dirt is to be cleaned from under reteiet wheel on hand brake staff and lubrirated with Elec. Car. Oil.	At each general overbauline period valves to be opened and cleaned. At each 15-day inspection period, all brake valves are to be inbrirated in with a tew drops of Galena Brake Valve Oil Will center beathers to be inbricated every 30 in the with Fisc. Car. Oil. All ball and collect days with Fisc. Car. Oil.	eenter bearings are not to be lubricated	All aide bearings to be lubricated every 30 days with Center Plate grease.	Theels to be inspected and inbricated every line with Cale and inbrication W. W. W. Wheels to Lubrication W. V. IIA	At each ceneral overbauling perior, Baser to be cleased and lubricated with vaccinic.	thery 4 days inspection perior 17-selling of of of single-strained arosers, respect to the single-strained of the spect of the perior of 18-selling of selling points and so the selling of 18-selling of selling of the selling of selling of the sel

The tinning equipment is shown in the foreground. Before the practice of tinning the bearing shells was started a large amount of trouble was encountered with the babbitt breaking away from the shell. The tinning of the shells has practically eliminated this trouble.

In order to move trucks and cars around the shop a transfer truck, illustrated in Fig. 1, is used. The truck has mounted on it a controller, resistance and leads to connect to the power supply and also leads to be connected to the leads of one motor. By this means a truck or car may be easily moved around the shop. The equipment on this hand truck is also used to test out the motors on the car trucks before the latter are assembled under the car.

The cars are revarnished once each year, one coat being applied. This policy has made it possible to eliminate much of the repainting and at the same time keep the cars in good condition. It is necessary only to repaint parts of the cars where the paint has been damaged. During 1922 none of the cars was completely repainted, 153 cars were partly painted and varnished, and 124 cars were revarnished only.

POWER SOURCE AND ECONOMY MEASURES

Coasting recorders were installed during 1919 and the resulting savings in the cost of operation are given in Table IV. After the recorders were installed one man was detailed to give full time to analyzing the results and instructing the motormen in the best methods of

Net saving		\$6,582	\$41,436	\$50,054	\$35,444
eluding maintenance, instruc- tion and elerical expense		4,927	8,093	7,799	7,431
Total Cost of operating recorders, in-		\$11,509	\$49,529	\$57,853	\$42,875
brakeshoes			\$5,000	\$5,300	\$2,914
Gross saving in fuel for power Savings due to increased life of		\$11,509	\$44,529	\$52,553	\$39,961
17-18 average		4.3	12.0	16.1	13.4
Kilowatt-hours generated per car-mile Percentage reduction over 1916-	3 67	3.52	3,23	3.08	3.18
Coasting percentages	#22.0	=27.0	36.0	38.1	36.8
	1916-17-18 Average	1919	1920	1921	1922
TABLE IVCOAST					

 st Recorders installed on all cars in June, 1919. Based on early records obtained from recorders, it is estimated that the coasting percentage previous to installing the recorders was approximately 22 per cent.

operation. The company considers the proper follow-up of results absolutely necessary in order to get the greatest savings.

Power is generated in the company's Georgetown Power Station, located at Wisconsin and K Streets. The generating equipment consists of the following: One 7,500-kw. G. E. turbine and one 5,000-kw., one 3,000-kw. and two 1,500-kw. Westinghouse turbines.

The power is generated at 6,600 volts, three phase, 25 cycles and transmitted to four substations having a combined rotary capacity of 15,750 kw. The location and installed capacity of the substations are as follows:

Substation No. 1, located at Fourteenth and V Streets, N.W., has one 2,000-kw. G. E. rotary converter and one 1,500-kw. and two 1,000-kw. Westinghouse rotary converters. Substation No. 2, located at First and B Streets, N.W., has two 2,000-kw. G. E. converters and two 1,000-kw. Westinghouse converters. Substation No. 3, located at Georgetown Power House, has two 1,000-kw. and one 750-kw. Westinghouse converters. Substation No. 4, located at Connecticut Avenue and Fessenden Street, N.W., has two 750-kw. Westinghouse rotary converters.

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New Repair Shops at Boston

Boston Elevated Railway Is Spending \$5,000,000 for New Shop Facilities—How the Work Will Be Routed Through the Various Departments, Which Are so Arranged as to Keep the Travel of Heavy Parts to a Minimum

HE EXTENSIVE repair shops which the Boston Elevated Railway is now building near the Everett terminal will occupy a tract of 22½ acres, thus making them one of the largest of the kind in the world. The floor area of these shops will be 493,478 sq.ft.

For a number of years the Boston Elevated Railway has had shops which were admittedly inadequate. The greater part of the car equipment repairs has been done in the Albany Street shops, which are largely the result of circumstances. These shops were originally part of the Hinkley-Williams Locomotive Works, which were purchased by the company in 1889 for power station purposes. In addition, the company has what it calls its Bartlett Street shops, which were originally built for horse-car repair, and it has a shop fitted primarily for inspection purposes, at its Sullivan Square terminal.

Decision to build adequate shops for the company was reached after the present shops had been outgrown and the necessity of new facilities became not only a question of economy but even a physical necessity for the furnishing of satisfactory service. Through the trustee form of management under which it operates. the company is able to secure credit for the construction of an extensive undertaking of this kind, and erection is now under way. The company hopes that the work on these new shops will be far enough along so that the tools now at the Bartlett Street shops may be transferred to the Everett shops about November, 1923, or in about eleven months, and at the end of the following twelve months that the Albany Street shops may be closed and the Everett shops will be able to take care of all of the work.

A preliminary perspective drawing and a plan of the shops were published in the issue of this paper for March 19, 1921. The plan, with some modifications, is reproduced on page 240, so that the following explanation of the shop arrangement will be understood.

It will be noted that there are four buildings, arranged for the handling of cars, two on each side of the transfer-way; i.e., wood shop, paint shop, equipment shop and repair shop. Track connections to transfer tables for surface cars are through the open space between the wood shop and equipment shop and for rapid transit cars through space between paint shop and repair shop. There is also a steam railroad track connection to the transfer table at the south side of the wood shop. The transfer tables will be of such dimensions and capacity as to permit the handling of loaded steam railroad freight cars, the largest rapid transit cars or the smallest surface cars. The arrangement of shops and transfer-way permits flexibility in the movement of cars from one shop to another as the progress and the nature of work may require. The transfer tables will be covered so that cars may be moved in stormy weather without their getting wet. To facilitate quick movement, transfer tables are

equipped with two 40-hp. motors and air brakes. Operating cabs are provided at each end of transfer table. An electric winch is also provided for handling dead cars.

The blacksmith shop is located adjoining the equipment shop and wheel and axle shop, the latter being also connected with the truck shop, which is in the repair shop building, and also with the first floor of the storehouse. A storage yard is provided for wheels, axles, trucks, etc. This yard is partially surrounded by the blacksmith shop, wheel and axle shop and storehouse and is served by a 10-ton crane. Scrap bins are also located in this yard which will permit the handling of scrap by electromagnet. Provisions are made for the handling of materials between yard and wheel shop, truck shop and blacksmith shop by a 5-ton telpher.

The motor and armature shop is located directly over the truck shop and the machine shop over the wheel and axle shop adjoining the motor shop and second floor of the storehouse, thus affording direct communication between these departments. Further detail description is as follows:

PAINT SHOP

This is a one-story building having twenty-two tracks and a capacity of fifty-two 50-ft. cars. A balcony 40 ft. wide is provided on the side opposite from the transferway about two-thirds the length of the building. The balcony will be used for miscellaneous painting, such as doors, sash, signs, etc., and locker rooms. Beneath the balcony is located the paint stockroom, glass storage, toilets, etc. A basement under the paint stockroom is provided for the tank storage of paint materials which can be drawn from outlets on the main floor.

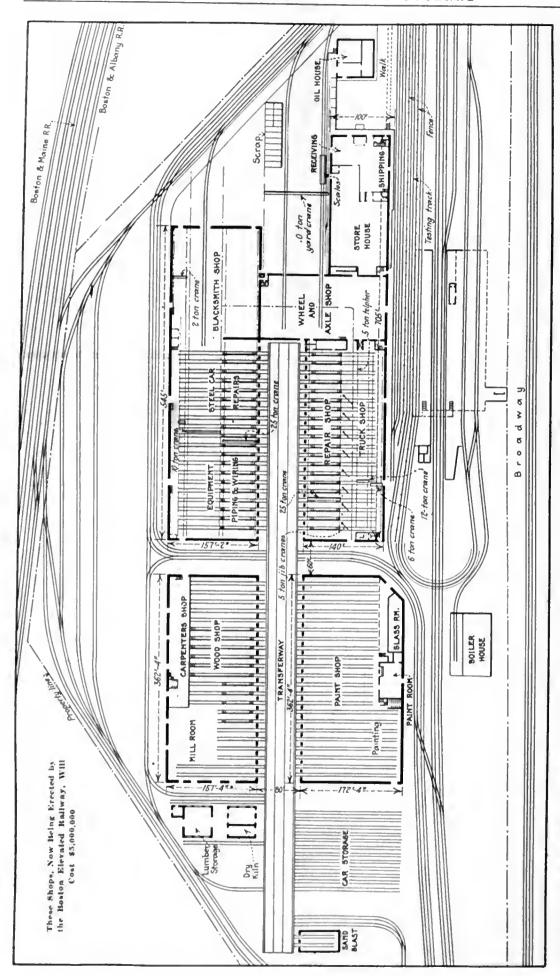
WOOD SHOP

The wood shop is similar in construction to the paint shop, having twenty-two tracks and a capacity of thirty-six 50-ft. cars. The mill room occupies a space 60 ft. x 150 ft. in the southwest corner of the building, and a balcony 35 ft. wide extends from the mill room to the end of the building on the west side. This balcony will be used for upholstering and cabinet work, locker rooms, etc. Dry kiln and lumber storage is provided in separate buildings adjacent to the mill room.

EQUIPMENT AND STEEL CAR SHOP

The equipment and steel car shop is a one-story building of similar construction to the paint and wood shop but with additional height to accommodate traveling cranes which will serve practically the entire area of the shop. There is one craneway having a span of 60 ft. and a capacity of 25 tons; another having the same span of 10 tons capacity and one with 16-ft. span and 3 tons capacity. An 18-ft. balcony is provided extending the entire length of the building on the west side. This balcony will be used for miscellaneous light work, locker rooms, etc.

Pits are provided for one car length on each track



on the transfer-way side. The 3-ton and 10 - ton craneways extend into the blacksmith shop, which will permit convenient handling of heavy or fabricated materials from that point to the location of assembling. There are twenty tracks giving a capacity of forty 50-ft. cars and an additional working and storage space 30 ft, wide the entire length of the shop.

REPAIR SHOP

The construction of this building on the transfer-way side for a width of 65 ft. will be one story, the same as the equipment and steel car shop section next to the transfer-way. There are twenty tracks having a capacity of that number of cars; pits are provided on each track. This section will be served by a crane, having a span of 60 ft. and capacity of 25 tons. This crane will be arranged with two trolleys, each trolley carrying two hoists properly spaced so that the hooks drop each side of the car body. This will permit the raising of car bodies by attachment at four points on the car sills without the necessity of using cumbersome spreaders and šlings.

The truck shop section is 75 ft. wide and extends the whole length of the shop. The tracks extend into the truck shop so that when the car body is raised the

trucks can be moved forward on the tracks into the truck shop. For handling motors and trucks there will be provided ten 5-ton jib cranes each serving two tracks, one 12-ton crane running lengthwise of the shop and having a span of 24 ft. and another 6-ton crane with a span of 24 ft. In a space between the jib cranes and craneways a 5-ton telpher rail is provided. This extends through the truck shop and wheel and axle shop to the blacksmith shop and storage yard and will be used largely for handling wheels and axles.

Motors will be taken off and installed in trucks in the truck shop, but motors will be repaired in a motor shop located on the second floor of the building above the truck shop. Motors may be handled between truck shop and motor shop by truck and elevator, or entirely by cranes, there being a hatchway provided in the motor shop floor through which motors may be hoisted from the truck shop by traveling crane on the second floor.

WHEEL AND AXLE SHOP

This shop occupies the first floor of the building at right angle to the repair shop and connects with the truck shop, blacksmith shop and storehouse. Two tracks run into the building for the receipt or shipment of wheels and axles by cars. A part of this shop will be used for such work as gear-case repairs, electric welding of truck parts, etc.

BLACKSMITH SHOP

The blacksmith shop is a one-story building with construction similar to the equipment and steel car repair shop with craneways of the two shops connecting. A track running into the shop provides for receiving material by car. The craneway extending through the end of the shop into the yard serves iron storage space adjacent to the receiving track.

Wash and locker rooms are located on a balcony at one side of the shop. A part of this shop will be used temporarily for a brass foundry.

MOTOR AND ARMATURE SHOP

As previously described, the motor and armature shop is located over the truck shop. A craneway extending the entire length of the shop is provided in the center section. This crane is of 5-ton capacity and has a span of 24 ft. Lighter traveling cranes are also provided in the other sections for handling motors and armatures. The impregnating and dipping room is arranged to be adjacent to baking ovens at the end of armature shop.

After the armatures are removed from motors in the motor shop they are cleaned and blown out by compressed air. They then pass down one side of the armature shop for winding, inspection and repairs. Then they pass through the dipping and baking process and return through the other side of the shop where they undergo commutator inspection and repairs, shaft inspection and repairs, banding and testing, arriving again at the motor shop ready for service. This plan provides, it is believed, for the least possible travel or handling of armatures. After the motors are assembled, they undergo a stand test to make sure that they are in perfect condition before being placed in service.

The present practice of supplying carhouses with spare armatures and field coils for motor repairs will be changed. Complete motors which have been thoroughly tested will be delivered to carhouses and

defective motors will be returned to the motor shop for repairs. To facilitate the handling of such motors, which are transported by truck or service, a 2-ton telpher is arranged in the motor shop extending over tracks at the side of the building so that the motors can be delivered on trucks or cars, or vice versa, with but one handling. On each side of the shop and running its entire length are 25-ft. balconies which will be used for coil winding, controller and miscellaneous electrical repair work. Toilet and locker rooms are provided at each end of the shop on both floors.

MACHINE SHOP

The machine shop is located over the wheel and axle shop and its arrangement is similar to that of the motor and armature shop, with a main floor and balconies. The central section of the main floor is served by a 10-ton crane having a span of 45 ft. All heavy machine tools will be located in this section so that heavy parts can be handled by crane. Smaller tools will be arranged on and under the balconies. A 10-ton elevator is located so that it serves all floors of the machine and motor shops. In addition to this there is a balcony provided at the main floor level of the machine shop and projecting over the storage yard so that tools or material can be handled direct from cars to the machine shop floor by the yard crane.

STOREHOUSE

This building is three-story with basement. The basement, first and second floors are occupied by the stores department, and the third floor by the department general office, drafting room, cafeteria, etc. This building is equipped with both freight and passenger elevators. The first floor is 4 ft. above grade and a platform is provided around three sides of the building at the shipping and receiving end at car-floor height. A steam railroad track is located on the yard side and surface car tracks on the opposite side, leaving the end platform clear for teams and truck service.

The oilhouse is located adjacent to the storehouse and connected to it by an extension of the shipping and receiving platform. The storehouse track also serves for the delivery of oil, etc., to the oilhouse by carload lots. Oil will be stored in tanks in basement and be drawn from outlets on the main floor, which is divided to provide for waste and packing storage, and a room for preparing and cleaning journal packing and filtering and reclaiming used oil. A large part of the oils and packing will be used at these shops, but the present practice of furnishing carbouses with oil and dry journal packing will be discontinued. Journal packing for the whole system will be prepared ready for use at the oilhouse and shipped to carhouses in suitable receptacles with weekly stock supplies, and all packing removed from cars will be returned to the oilhouse for cleaning, sorting and resaturation.

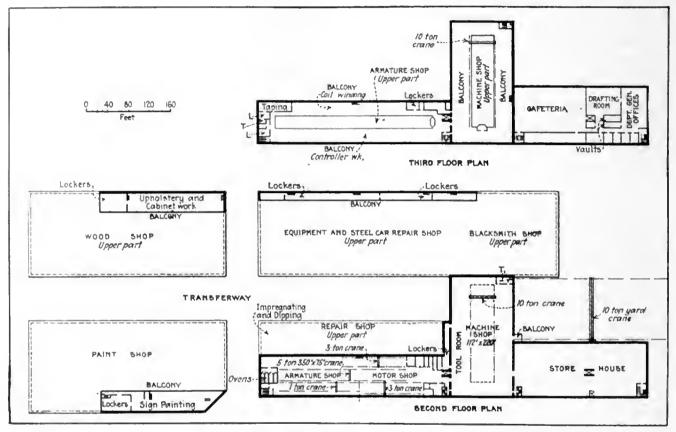
OVERHAULING BEGINS IN REPAIR SHOP

The work of overhauling will be begun in the department marked in the plan "Repair Shop." It is expected that every car will be overhauled about every twelve or eighteen months. When a car enters the shop for overhauling, the body is raised by a crane, which serves all of the tracks. The trucks are then run out into the truck shop for overhauling. Other equipment which is in need of overhauling, such as trolleys, circuit

breakers, controllers or contactors, compressors and wearable parts of air-brake equipment, will be removed from the car and sent to the proper department for repairs. The car body, having been placed on dummy trucks, is then taken to the various shops, depending upon the class of work to be done. If piping or wiring repairs are required, it goes to the equipment shop; for woodwork repairs, it goes to the wood shop; then to the paint shop and finally returns to the repair shop for trucks and equipment which have been overhauled, thus holding the car out of service the least possible time and reducing to a minimum the spare equipment requirement.

is nearly due. Likewise there will be a large number of elevated cars which will go to the repair shop only for change of motor or wheels, as owing to the large number of curves on the Boston rapid transit lines, it is necessary, on account of wheel wear, to remove wheels frequently for grinding and turning. This amounts to ten or twelve cars per day. It is the intention to do all overhauling work for both surface and elevated cars at the general shops, leaving only cleaning, inspection and light repairs to be done in the carhouses.

It will be about a year and a half before the company will have to buy any new tools for the shops. Much of the tool equipment of course will be taken from the



Plans for the Second and Third Floors of the New Boston Elevated Shops

Adjacent to the repair shop there will be a test track which has a level tangent of approximately 900 ft. This will be equipped with both overhead trolley and third rail, the feeders for which will pass through a test room in the motor shop, where a graphic recording ammeter is installed. After cars have been through the shops for overhauling they will be given a running test on the test track to determine their braking efficiency, smoothness of operation, etc. By means of the graphic recording ammeter installed in the test track, feeder circuit faults in wiring connections, resistance grouping, automatic relay setting or control functioning can quickly be determined without the necessity of conneeting test apparatus in the car wiring. This is somewhat of a departure from the practice of other electric railway companies so far as is known and simplifies greatly the work of the test engineers.

The foregoing details outline the routine of cars going through shops for general overhauling, but of course cars for collision damage repairs will not go through this routine unless their time for overhauling present shops. The company's equipment of tools is quite complete except where it has been impossible to install new tools because of lack of room.

ESTIMATED SAVINGS

It is estimated that the savings resulting from the shorter time that will be necessary to hold cars out of service for repairs and overhauling and the reduction in the number of cars taken out of service on account of failures will be equivalent to a gain of 100 cars at an average value of \$12,000 each. It is also believed that there will be a 50 per cent reduction in the number of car failures with a great saving in lost time of crews, pull-in mileage, loss of fares and other items. These savings, outside the gain in more efficient car service, have been estimated by the company at \$332,500 per year. Other savings, including an estimated 10 per cent in efficiency in labor, amount to \$376,360 a year. Detailed figures on the various estimated economies to be secured from this shop were given in the article In the issue of March 19, 1921, already referred to.

Just 121

Better Service Possible in Richmond

In Mr. Beeler's Report on Organization and Service, He Tells How, Through the Co-operation of the City and the Company, Electric Railway Service in Richmond, Va., Can Be Speeded

Up and Other Improvements Made

THE third portion of the report on the Richmond railway division of the Virginia Railway & Power Company, being prepared by John A. Beeler, has just been submitted to the City Council of Richmond, Va. This is the concluding portion of the report which Mr. Beeler was engaged by the Council to make on the Richmond railway situation. The first portion, abstracted in the issue of this paper for Dec. 9, 1922, considered the finances of the company. The second was a valuation report and was reviewed in the issue of this paper for Jan. 27. The third portion comprises about 150 typewritten pages with maps and diagrams. It takes up the organization and operating methods of the company and contains recommendations for improvements in both, as well as for comprehensive rerouting. An abstract is published below of the comments on organization and methods. A review of the rerouting suggestions will appear in a later issue.

HISTORY AND PRESENT ORGANIZATION

The Richmond street railway system is one of the earliest in the United States. The first of its constituent companies came into existence as early as 1860. To Richmond is accredited the honor of the first electric railway system. This was consummated as far back as 1888, when the Sprague system was installed on a portion of what now is known as the Clay Street line. Originally independent companies competing for the patronage of the public, the properties have been merged and consolidated into the present single system. These consolidations have not always been effected in such a manner as to afford the best results from the standpoint of either public or company. Much duplicate track remains, and even where parallel tracks have been replaced by single lines, duplicated service has been operated on the one street. With public and company now ready to get together, a greater economy and efficiency of the service should result.

As at present constituted, the Virginia Railway & Power Company consists of two main districts, that comprising Richmond and vicinity and that comprising Norfolk and vicinity. The principal officials of the company divide their time between the various phases of the company's activity. These officials seem anxious to take any steps that will better the service rendered the public, but their willingness to adopt suggestions and ideas does not always appear to be communicated to their subordinates. There is a certain amount of lost motion in the execution of any policies whose application is not directly in the hands of the higher officials.

The Richmond railway division is one of the main departments of the company and earns a large share of the gross revenue. There is, however, no responsible head who devotes his whole time and energies to this most important section of the property. The present plan of having one official in charge of both the railway and light and power divisions, not only in Richmond but in other parts of the system, is not securing the best results. A better method would be to have a manager

for this division alone, who would report to the president directly.

Any street car system has as its main object the saving of time for the patrons. Regularity, frequency and speed are prime requisites in obtaining this result. Delays and lost motion must be minimized. Each minute of street car time costs the company on an average about 5 cents. A saving of but one minute on each single trip would amount in a year to \$100,000. Since people want more rapid service it works both ways, as

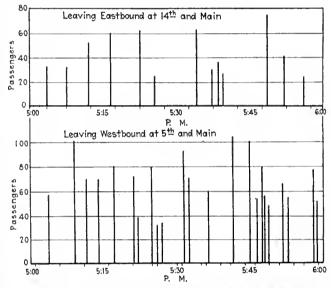


Chart Showing Irregular Car Spacing and Londing on Main Street Line During Rush Hours

(The observed time and load of each car are indicated above the base line; the schedule time is indicated below the base line. Observations were taken on Aug. 31, 1922.)

the patronage will be increased. Thus efficient service and successful management go hand in hand. A campaign for saving seconds would be a good start on the road to thrift.

TRACK AND TRACK EQUIPMENT

Speaking generally, the track in Richmond is in fairly good physical condition, but the existing special trackwork has been designed almost entirely for the operation of the regular routes, and the arrangements for emergency movements or revision of the present routing are poor. The company's engineers should give careful attention to this subject, and future orders for special work should include such additional connections as may be desirable. In any rerouting some left-hand turns in the business district could be taken out to advantage.

Almost without exception the curves on double track, whether plain or in special work, are not designed to permit cars of any type now in use to pass each other. From an operating standpoint this is almost the equivalent of the introduction of a stretch of single track. This condition causes delays, especially during rush hours, when the streets should be utilized to their full capacity. All layouts for future construction should

provide for clearance of the largest cars in service. The city should co-operate with its approval of such plans, even though it may be necessary to revise the curb lines at some corners.

While electric switches are advisable wherever the headway on joint track is more frequent than approximately five minutes, there is none in operation today in Richmond. At several heavy junctions switchmen are employed during rush hours only, but at other times all switches are thrown by hand. The usual practice is for the motorman to leave the car, walk in front, with a hand switch-iron move the tongue, and then return to his position. This operation wastes valuable time and in the rush hours is a cause of congestion. With safety cars the operator cannot always leave his post until after alighting passengers are off the car. Entering passengers begin boarding while he is off the car, making it difficult to check up the fares, and possibly resulting in a loss of revenue. The installation of electric switches is recommended at all regularly used junctions in the business districts, and at any other points outside where the headways are sufficiently close to justify them. In addition to eliminating switchmen at certain locations in rush hours, it will speed up car movements at all times.

Spring switches should take the place of loose-tongue switches at all entrances to double track and turnouts. Where this cannot be done without extensive reconstruction of the switch, rubber blocks should be installed at once to perform the same function.

TYPES OF CAR EQUIPMENT

At present numerous types of cars are in use, but the safety car is the most suitable for Richmond requirements. This is the latest type purchased by the company, and future purchases should be confined to this type. The specifications, however, should call for front doors wide enough to accommodate two streams of passengers and rear doors wide enough for one stream. The front doors then can be used at all times of day to allow passengers to board and alight simultaneously or for the movement of a double file, as the demands occur. The rear doors will be used by street collectors in the rush periods only, to allow passengers to alight or board, thus keeping the rear of the car better filled. More modern fare boxes, in which it will be easy to drop coins or tickets, should be used.

DESTINATION SIGNS

A feature of great importance in giving satisfactory service is the use of legible and distinctive designations by means of which the prospective passenger may determine if the car approaching is the proper one for him. This is particularly necessary at night, as the headways are longer and the cars difficult to distinguish.

At present there is no standard practice in the signs used in Richmond. Some of the cars have them in the monitor deck, others on top of the platform hood, while still others use illuminated signs in the front vestibule windows. A few cars also have painted dash signs. On some cars the most valuable space available, in the front vestibule window, is taken up with a sign calling attention to "Safety First." This admirable sentiment is being displayed to the detriment of the service, as the space should be used for its proper purpose.

The present practice in Richmond seems to be to display a name for the route, which is used at all times for both directions of travel of the car. This is confusing to any but constant riders on the line. A better plan is to display some distinguishing route name, and in addition the terminal toward which the car is moving.

Cars serving railroad stations should be marked distinctly. Special signs can be used for the purpose, so that strangers can find the correct cars readily.

PASSENGER STOPS

The number of stops made by a street car has a great bearing on the quality of the service and its cost. The more stops a car must make, the slower the speed. The comfort of the riders is less with added stops, on account of the jerking in stopping and starting the car. Frequent stops usually lead to irregularity of headways. One of the common complaints in Richmond is the slowness and unevenness of car operation.

The usual argument in favor of many stops is the added distance that must be walked by the patrons if they are reduced. This is true, of course, and it must be weighed against the advantages from reduced stops. In most cities it is found that a balance is reached at from six to eight stops per mile. This spacing is sufficiently close that no inconvenience is suffered by the riders in having to walk great distances to car stops, while the schedule speed can be increased materially and better operation obtained.

The amount of service rendered by each car is increased if it is run on a faster schedule, as it can make the trip in less time and cover more car-miles in a day's run. The extra cost of power and other items is but a trifle compared with this. In fact, if properly operated, the cost per car-mile may be less with the higher speed, as it is easier to train the men to run the cars well. The quicker service will attract riders who might otherwise walk or seek other means of transportation, so that the patronage may be increased.

In the city of Richmond there are many places where the stops are too close together for good operation. To determine the existing condition the routes were divided into mile sections and the stops in each counted. It was found that in the territory within 1 mile from the center of the business district there are sixteen or more stops on practically every route, except those on the viaducts and bridges, on which of course few stops can be made. In certain other sections the spacing is even closer.

Such stop spacing is not justified. Reasonable schedule speeds under such conditions are impossible. One of the worst features is that, while the use of these stopping places may be restricted somewhat during the midday, the cars are obliged to stop at practically every one of them in the rush hours. This was found in observations of the number of stops actually made on each route. For example, on the Main Street line in the mid-day the stops averaged thirty-four and one-half for the trip. In the evening rush this increased to fifty-seven stops made in the maximum direction. In the other direction fifty stops were made. This took an addition of seven minutes to the running time. The observed speed in the mid-day was 8.8 m.p.h., while in the rush, westbound, the speed was only 7.2 m.p.h. In other words the cars were making their scheduled speed in the non-rush, while in the rush the speed was nearly 20 per cent slower.

The average stop spacing in Richmond is in the neighborhood of 330 ft., or sixteen per mile. This is just twice the spacing considered good practice in many progressive citles. A spacing of 660 ft. has been found very satisfactory where it has been tried, and there is

no reason why it should not be applicable to Richmond. A somewhat greater spacing has been used in Washington for the past five years with highly satisfactory results.

In the application of any spacing such as the above, it is essential that all conditions be studied carefully, so that the locations chosen for stopping places will serve the public best. Much of the difficulty of various plans for stop spacing has been due to ill-chosen locations. The company should make a careful study of the subject, with a view to the adoption of an improved spacing.

There are certain places where a rearrangement of stopping places can be made to advantage regardless of the number involved. A stop should not be made on single track if there is a possibility of one on double track serving the location. For instance, stops should not be made at the entrance to a turnout if it is possible to make a stop in the middle of the turnout. By this means cars moving in the direction opposite to that of the car stopping will not be delayed. This is important, as maintenance of meets on single track is vital in keeping reasonable schedules.

POSITIVE STOPS AND STOP SIGNS

Positive stops are observed where it is presumed they add to the safety of car and vehicle operation. At certain points they serve a very useful purpose. It is, however, common practice to have positive stops ordered for various reasons which have nothing to do with safety, and sometimes they are enforced long after the disappearance of conditions for which they were installed. A study of Richmond conditions shows that the city has an excessive number of positive stops. Boulevards are important arteries of passenger travel, but the number of persons in automobiles accommodated by requiring every street car to stop before crossing is small compared with the number of car patrons discommoded by the practice.

At street car intersections positive stops are made by cars approaching on all lines. This is unnecessary, as the heavier or more important line can be given the right-of-way and the other line required to observe the stop. This will speed up considerably more than half of the cars with no reduction in safety.

The company should make a careful investigation of this subject, and all positive stops should be eliminated except those serving such definite purposes as at steam railroad grade crossings, going down steep hills, or at street car intersections as recommended in the preceding paragraph. The city and company should co-operate to keep the number of such stops down to the minimum essential to safety.

Considerable confusion now exists in Richmond as to the exact locations of stopping places. This tends to slow down service and annoy patrons. The condition can be remedied by the installation of signs at all stopping places indicating exactly where patrons should stand to be at the entrance to the car, and cars should be stopped at this point. Positive stops should be marked by signs on the trolley wire unless they also serve as passenger stops, in which event both signs should be displayed.

A yellow disk bearing the words "Car Stop" has given satisfaction in Washington and elsewhere. It may be useful in the Broad Street business district in Richmond, where the trolley poles are in the center of the street. Such signs should be placed at the curb, directly

opposite the stop. For the other locations, the trolley poles can be painted with yellow bands about 3 ft. wide and bearing the words "Car Stop" thereon in black letters. The use of signs of this type has been found excellent where it has been tried, and it is much cheaper and more permanent than any other device proposed.

The success of any plan for revision of stopping places will depend in a large measure on the care with which the stop locations are indicated.

Double-Berthing and Safety Zones

Double-berthing or loading of cars in pairs should be employed at all important stops included within the congested district. The first car to approach the stop always should take the forward position. When a second car arrives while the first is still standing, it invariably should take the second berth, and when it goes forward after taking on and discharging passengers, it should proceed without stopping at the forward position.

At the more important stopping places in the congested district there should be well-defined safety zones in which passengers may congregate for boarding a car. Such zones can be installed with satisfaction in roadways with a width of 43 ft. or more. In locations where safety zones are permissible it may be equally possible to use raised loading platforms. These platforms should be long enough to accommodate two cars and from 8 to 10 in. high. They may be built of wood or concrete. While the concrete forms a more permanent structure, wood has the advantage of quick installation and may be used temporarily.

Loading platforms are more desirable than the safety zones, since they bring the waiting car patrons close to the level of the car step, thus in effect eliminating the first step from the street into the car. Platforms should be installed at the heaviest points of loading where the street width will permit. It is desirable that platforms should be at least 5 ft. wide, and approximately 2 ft. are needed from the gage line of the outer rail to provide clearance from the car steps. This makes necessary a minimum width of roadway of 49 ft. if platforms are to be used with success.

When either loading platforms or safety zones are installed they will fail of their purpose unless traffic is kept moving. Regulations should be such that vehicles will not be required to stop behind standing street cars, but will proceed past the safety zone or platform whenever the traffic officer permits. Of course no vehicles should be allowed to stop opposite the platforms or safety zones at any time, except for traffic control. Generally speaking, it is preferable for the city to own the platforms and police them, since better observance of rules can be obtained if these rules are backed up by public authority.

FARE COLLECTION

One source of delay in car movement in the congested district is the time required for loading, which is determined to a considerable extent by fare collection. Any odd fare takes longer to collect than an even one, such as 5 cents or 10 cents. Recently the company has begun the sale of tokens at the regular cash fare rate, and the public can co-operate by using them to the exclusion of cash, particularly in the rush hours. The company should make the purchase of these tokens as easy as possible.

At certain congested corners the company now has

supervisors to direct the public and assist in car loading, but their duties keep them from devoting their entire time to fare collection. At such points it is desirable that men be stationed to devote their time solely to this. These men should sell tickets, collect fares and assist passengers. This practice has been used with success in various cities, both with one-man and with two-man cars. If properly carried out, the use of street collectors results in more even loading of the cars and reduces the time lost at stops.

VEHICLE PARKING

One source of delay to street cars and vehicles alike is parking in the congested district. Parking should be prohibited during the rush hours on Main Street between Sixth and Fourteenth, and at other places where it may be found to cause difficulty in vehicular and street car movement. Of course, parking opposite a ear stop should be prohibited throughout the city.

RUNNING TIME

The running time used by a street car in making its trip is of vital importance in the quality of service and its cost. The slower the running time the poorer the service and the greater the cost. Everything should be done to keep the cars moving, since it tends to increase the receipts and decrease the expenses. Of course the limits are safety and maintenance of schedules, but experience in other cities indicates that schedule speeds of from 10 to 12 m.p.h. between terminals can be maintained on nearly all portions of the Richmond system without sacrifice of these essentials.

The running time that can be adhered to usually cannot be the same at all periods of the day, due to variations in number and length of stops and interference from street traffic. The allowed running time at each period of the day should represent the average that can be maintained. Strictly speaking, this would require a different running time for each trip, but usually two schedules, one for the rush and one for the non-rush, are sufficient to provide good service at reasonable cost.

The present schedules in general do not provide layovers at line terminals. Better operation will be obtained by including a layover in the schedule. The speed of the cars on the street then can be increased, and when delays occur the time lost can be taken out of the layover time. Faster transportation for the street car patron results and adherence to schedules is closer.

HEADWAYS AND SERVICE

The headway of the cars is a vital point in service. There are two prime considerations as regards headway-frequency and regularity. In Richmond the frequency of the service is as great or greater than needed to give adequate accommodations to various parts of the city. Experience has shown that when the interval between cars exceeds five minutes, some even division of the hour makes the service more satisfactory to the habitual riders. By this arrangement it is a simple matter to tell when to expect a car, no matter what the time. For example, with a ten-minute headway the cars will be scheduled to pass any point at equal intervals after each hour, while with a nine-minute headway there is no way of telling unless one knows every leaving time on the schedule. The closer spacing is then a disadvantage to the regular rider.

To fit average conditions in the non-rush hours even

headway should be provided over extended periods, with changes only as necessary to take care of wide differences in demand. For instance, service should be adjusted after 8 p.m., as the counts show that riding is much less after that time on most of the lines.

Headways on joint track which are a combination of different spacings are not efficient, although in some cases they are unavoidable. For instance a four-minute headway on one line and a five-minute headway on another cannot give good spacing. Such headways should be avoided if possible, and especially so if the cars run for long distances on the same track.

RUSH HOUR HEADWAYS

In the rush hours the headways should depend on the traffic to be carried by each line. The cars should be scheduled to give as regular service as possible consistent with the fluctuations of the loading. The method generally in use in Richmond is to continue the base service through the rush and add "tripper" cars placed in between the regulars. This does not always meet the requirements. The practice in use on some lines of having the base headway supplemented by a separate rush hour schedule with an entirely different headway is especially to be condemned. For instance, a six-minute headway is improved relatively little for rush service by the addition of a separate seven-minute headway. This makes a condition almost impossible to carry into operation. The uneven spacing and bad loading that result from this practice on certain routes are illustrated in the diagram on page 243, which shows observed conditions on the Main Street and the First and Viaduct lines. In this diagram the scheduled time and the actual time are given for comparison. The bad results of such scheduling are apparent.

This can be remedied by making a special timetable suited to the conditions existing on the line in the rush hour and providing whatever cars are needed to meet the demand. The regular cars can be fitted into this schedule to the best advantage and extras added to complete it. In this way it is possible to modify the headway so that all cars can be given their proper share of the load. This tends toward better and faster service.

SUPERVISION

Even though the schedules are corrected, they will do little to improve service if the trainmen do not adhere to them. With proper headways and running time, the supervisory force must see that they are maintained. It is an advantage to have close inspection at all times and have the trainmen know that irregularities must be accounted for.

Trainmen must understand that the timetables are made up for a definite purpose, and that they must be followed as closely as possible. Reference to the diagram shows that there is no serious attempt made to keep to schedule. It will be noted that several cars apparently arrived ahead of time. This is a practice absolutely without justification and should be dealt with as a scrious offense. It will be noted that considerable of the bunching is due to one car arriving late, followed almost immediately by another car that is early. The first car usually was overloaded, while the second car did not have a seated load and in some cases was almost empty.

Accurate timepieces are absolutely essential to maintain good schedules. A car one minute off time will cause a 50 per cent variation in the headway on a five-

minute line. Trainmen's watches should be of such quality that they can be relied on to keep reasonably accurate time. They should be approved and inspected by a competent watch inspector and should be checked daily against a standard clock.

Power-Saving Devices

All cars should be equipped with some one of the power-saving devices now on the market. The results obtained by the use of such appliances are far-reaching. Minimum power consumption with a given schedule

requires uniform acceleration and a minimum of braking at a uniform rate. These features give smooth operation. The power-saving device tends to insure this. In some cities it has been found that schedules are made more easily with reduced power consumption. Not only is power saved but equipment maintenance is decreased as the result of better operation. The elimination of jerky stopping and starting ordinarily gives the operator better control of his car and tends to reduce accidents. Smooth operation in general will be appreciated by the public.

Toronto System Worth Nearly \$12,000,000

Two Arbitrators in the Long-Drawn-Out Toronto Case Render Decision for This Amount—City Appointee Disagrees—Case Will Probably Be Appealed to Privy Council

N JAN. 31 a majority of three members of the Toronto Railway board of arbitration announced that a decision had been reached by two of their number as to the value of the Toronto street railway system, which was taken over by the city on Aug. 31, 1921. The majority decision is signed by the chairman, Hume Cronyn, K. C., M. P., of London, Ont., and by Sir Thomas White, who represented the company. The third arbitrator, Sir Adam Beck, made a minority report.

ABSTRACT OF MAJORITY DECISION.

The decision first recites the conditions of a contract made Sept. 1, 1891, between the city and Messrs. Kiely, Mackenzie, Everett and Woodworth, incorporators of the

Toronto Railway, by which they secured the right to operate the line for thirty years, after which the city could take it over under certain conditions as to valuation. This contract declared, among other things, that:

At the termination of this contract the city may (in the event of the Council so determining) take over all the real and personal property necessary to be used in

connection with the working of the said railways at a value to be determined by one or more arbitrators (not exceeding three) to be appointed as provided in the municipal act and the acts respecting arbitrations and references, and to have all the powers of arbitrators appointed under such acts, and each party shall bear one-half of the cost of the necessary arbitration at conclusion of term of lease, but the city shall only pay for the land conveyed by it to the purchaser what it is worth, without reference to its value for the purpose of operating a street railway or railways.

In arriving at such value, the arbitrators are to consider and award only the value of the said several particulars to the city at the time of the arbitration, having regard to the requirements of a railway of the best kind and system then in operation and applicable to the said city.

The majority report divides the property into two parts. Part A includes all of the property, real and personal, which the city took over from the company and accepted as part of the property necessary to operate the line and Schedule B the part which the city claims to be entitled to reject.

The first question to be decided by the board was that of the time as of which the valuation was to be made, because of the decline which has taken place in prices of commodities and in rates and wages since 1920. The decision points out that the clause in the contract makes no explicit reference to this question, although it might be inferred from its language that its valuation would be as of about the date at which the railway was taken over by the city. Section 4 of the authorizing statute, however, provides "that the award of the arbitrators shall be made, if possible, not later than the time named by the city for taking over the property," and that "the arbitrators shall consider only the value to the city at the time of the arbitration." From this the arbitrators decided in favor of a valuation as that of the time of

the arbitration. Counsel for the company placed in evidence figures showing what it would have cost to reproduce the railway property over a period of three years prior to Sept. 1, 1921. This evidence was offered on the assumption that if the city had been obliged to construct a railway system, it would have had to begin three years before to be in as

have had to begin three years before to be in as good a position as it was on Sept. 1. 1921, when it took over the railway without interruption of operation. As the cost of construction was higher on the average of this peak year period, the adoption of this theory would have materially added to the valuation of the road. The board said, however:

'We are unable to conclude that this would be a sound principle of valuation, nor do we know of any judicial decision of a purchase case which sustains it. It seems to us that so far as the principle of reproduction cost, less depreciation, is availed of, it must be reproduction cost as of the "time of the arbitration." We have therefore rejected this contention of the railway company.

PRICES WITHOUT ANY WAR

Counsel for the city also introduced testimony of a theoretical character based on the comparative statistics as to prices of materials and rates of wages prevailing before the war, and designed, generally speaking, to

Particulars of Toronto Valuation

.(From the Toronto Evening Telegram)

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show what it would have cost to reproduce the system had there been no war and had the trend of prices and wages in progress before the war continued down to the time that the property was taken over. It was contended that under the terms of the agreement value should be determined upon this "trend" basis, rather than by reference to the cost of reproduction, less depreciation, as of the time of arbitration, because of the rise, which, owing to the war and post-war conditions, has taken place in prices of materials and in wages as compared with those of the pre-war period. The board, however, rejected this contention, saying:

Value means value in lawful money of Canada at the time at which the valuation is made, not in lawful money of Canada as of an imaginary period. We are unable to find anything in the agreement or in judicial decision sustaining this view. In our opinion it would be impossible to determine the "actual value at the time of the arbitration" upon such a hypothetical basis, which has no reality in fact, and consequently seems opposed to the meaning contained in the word "actual" in the expression "actual value."

The board, however, in certain figures which it gave in its report, shows figures based in this way, which it calls the "trend basis."

As previously stated, one of the clauses in the original agreement required the arbitrators to award "only the value of the said several particulars to the city at the time of the arbitration, having regard to the requirements of a railway of the best kind and system then in operation and applicable to the said city."

There was considerable discussion during the hearings as to the meaning to be attached to the expression "best kind and system." The commission says, however, that it was established in evidence that the system under which the company was operating up to Sept. 1, 1921, viz., the electric overhead trolley system, is the best system in use for the operation of surface street railways and that it is applicable to the city. The arbitrators therefore regarded in their valuation the requirements of an electric overhead trolley railway of the best kind now in operation applicable to the city.

WHAT IS ACTUAL VALUE?

In discussing this question the arbitrators quoted extensively from various valuation decisions in Great Britain, particularly that concerning the Edinburgh Street Railway, London Street Tramways and Oldham Electric Tramways and also from the case of the Melbourne Tramway & Omnibus Company, Ltd., and concluded in favor of the method of cost of reproduction, less depreciation. On this the decision says, in part:

As to all the plant in situ, such as track with substructures, overhead and underground distribution systems, machinery and equipment fixed in place for use in the operation of the railway, it seems clear from the foregoing decisions and judicial utterances that an approved method of determining their value is cost of reproduction at the time as of which the valuation is made, less a proper allowance for depreciation.

Counsel for the railway company contended that the word "depreciation," as used in these decisions, means only physical wear, and that obsolescence, unless so complete as to require or justify immediate removal of the item of plant under consideration, is not to be considered. We do not concur in this view. We understand the word "depreciation" occurring in the decision cited to include obsolescence and deterioration from whatever cause, and not as confined to physical wear and tear and to what might be called "obsoleteness" as distinguished from "obsolescence" at the time of valuation. The fact and degree of obsolescence must be determined from the evidence upon the point having regard to good practice in railway administration and to the qualification of the above recited subsection 4 of section 4 of the statute.

With respect to immovable plant in situ, this method of valuation seems the most practicable and convenient. In applying it, however, care must be taken to make full deduction for depreciation as defined. Take the case of a section of track which has become so worn that it should, having regard to good practice, be taken up and replaced by new construction. The cost of reproduction of the section in question might be quite large, but there would have to be deducted an amount for depreciation which would leave only scrap value remaining. In cases of parts or articles connected with plant in situ, which although useful are not now being manufactured, value may be estimated by references to prices of parts and articles which can be bought today, taking into account of course comparative utility depreciation and all other relevant considerations.

VALUATION OF ROLLING STOCK

The same method (reproduction cost less depreciation) may, we think, be useful also in valuing the rolling stock of the railway company, as was done by the arbitrator in the Melbourne tramway case referred to above. In the case before the board, where so many of the cars taken over are of older type, it would, however, be most difficult to make the valuation solely by reference to cost of reproduction new, less depreciation. We have had placed before us, however, a great deal of evidence as to the character of this rolling stock, its original cost of construction, reproduction cost, physical deterioration, degrees of obsolescence, and as to alleged defects and advantages from the operating standpoint. All this evidence has been given its due weight in reaching conclusions as to the value of the rolling stock.

The principle of reproduction cost, less depreciation, is also of service in valuing buildings, such as carhouses, car construction, repair shops, substations and the plant and machinery which they contain. Care must be taken here also to make full deduction for depreciation (including obsolescence) and to take into account the evidence adduced bearing upon the question of the suitability of such buildings, plant and machinery for the purpose for which they are being used, and, generally, all factors bearing upon the matter of their usefulness and fair value, subject to the qualification of the agreement and statute.

With regard to tools, stores and small chattels (fixed or unfixed) generally it is not necessary to go to the trouble of considering what it would cost to reproduce them new and then deduct an amount for depreciation. We have had evidence as to the market value of such chattels or of others which would serve as well or better, and from such market value and comparison and other evidence relating to use, condition and extent of depreciation, a conclusion as to value may be reached.

How Land Was Valued

As to land (other than land acquired from and now retaken by the city) it seems to us that it should be valued at its fair value as of the time of the arbitration. In estimating its fair value we are, we think, entitled to consider, in addition to other relevant factors of value of individual parcels, their auitability (having regard to size and location) for street railway purposes. As to the land (including buildings) acquired from the city by the purchasers and question is, what is its fair value without reference to its value for the purpose of operating a street railway.

With regard to the former class of land, counsel for the company adduced evidence not only as to its present value for commercial purposes, but also as to its value for street railway purposes. To establish the combined value they brought forward testimony as to what it would cost to obtain property as suitable if the land in question had not been acquired and was not available for the city'a use in the operation of the system. This testimony showed that in some instances a price two or three times the commercial market value of the land in question (considered without special reference to its suitability for railway purposes) would have to be paid in obtaining parcels of equal size and suitability. It does not appear to us that this is the true method of valuing this land. The land has been acquired by the company and the city is entitled to take it over as it. The real question is, what is its fair value having regard to all proper factors, including the factor of suitability for railway purposes.

With respect to overhead charge, the arbitrators point out that the agreement and statute provide for the payment only on "actual and tangible property." After quoting various British authorities, they decided to include an allowance, even under this limitation, for engineering cost, for which they allow \$375,000. They also thought it proper to make reasonable allowance for interest during construction, and for this amount allowed \$525,000. The arbitrators, however, allowed nothing for the preliminary expenses of organizing the company or for the cost of raising capital or other charges connected with the issue of securities. They also excluded such items as "contingencies and omissions," "administration, organization and legal expenses" and "cost of placing the physical property in operation," saying:

While items of this character are frequently taken into account for rate-making purposes, they must be regarded as so-called "intangibles" and are not capable of being included within the meaning of the words "actual and tangible property" in the agreement and statute.

The board also decided that the city need not pay for the cost to the company of the construction of a subway under the tracks of the Canadian Pacific Railway and a bridge over the steam railroad, saying:

These payments were made by the company in pursuance of orders of the Board of Railway Commissioners for Canada, the object being the elimination of dangerous level crossings and consequent protection and convenience of the public. It does not appear to us that these payments constitute "actual and tangible property" within the meaning of the statute, and we are unable to agree with the argument put forward by the counsel for the company that these payments became, so to speak, attached to or inherent in the cost of construction of the tracks of the company carried through the subway and over the bridge respectively.

The arbitrators were in doubt as to whether they had jurisdiction to decide whether they should allow interest. As, however, the city has had possession of the railway since Aug. 31, 1921, and the company has not received payment, they allowed 5 per cent.

They decided that the power house property should be taken over, but valued the steam power plant upon a "scrap basis." The board also decided that three storage battery properties were "necessary to be used in connection with the working of the railway within the meaning of the agreement" and allowed \$338,500 for them. On a three-year average basis these figures would have been \$352,200, and on a trend basis \$197,100. The board also included as property to be taken over by the city a storage yard and carpenter shop, which, with buildings, tracks and structure, equipment and furniture, were valued at \$65,000.

On the other hand the board decided that certain property could be rejected by the city, including the main office building, a property at Scarboro Beach, and certain rolling stock, patterns and materials.

Combining these valuations with the valuation of the undisputed property, the board found a total valuation for both the undisputed and the disputed of \$11,188,500. On a three-year average basis the figure would have been \$11,650,400, and on a trend basis \$7,577,100.

MINORITY REPORT

Sir Adam Beck, the minority member, filed a brief, dissenting report, saying that he was unable to concur in the conclusion as to the method which should be adopted in ascertaining the value of the railway plant and equipment, also from the statement of the majority as to certain of the property which the railway claimed should be valued as property required for the operation of the railway. In regard to depreciation he said:

With regard to the matter of depreciation I would allow all that the city has contended for by reason of obsolescence. Much of the track is antiquated and required to be replaced when the railway was taken over. Much of the rolling stock is out-of-date and costly to operate as compared with modern cars. I agree entirely with the contention of the city that the question of economy in operation is of vital importance in estimating obsolescence. The statute expressly provides that the arbitrators shall award only the value to the city having regard to the requirements of a railway of the best kind and system in operation and applicable to the city, and in my opinion, the basis of valuation as fixed by the agreement between the city and the railway company does not admit of any allowance being made for cars and equipment which are useless for the purpose of such a railway and should be valued only at what they can be sold for.

Among the prominent engineers engaged in the case for the company were Hagenah & Ericson of Chicago, A. L. Drum of Chicago and M. E. Cooley of Ann Arbor, Mich.

Jackson & Moreland of Boston were in charge of the case for the city, assisted by Prof. A. S. Richey of Worcester, Mass., who valued the rolling stock.

Numerous other prominent engineers were called in to deal with special features of the property.

Successful Interurban Radio Reception

JAN. 25, 1923, being the tenth anniversary of the opening for operation of the Excelsior Springs Division of the Kansas City, Clay County & St. Joseph Railway Company, a dinner in honor of this event was served at the Elms Hotel, Excelsior Springs, Mo. Seventy-six guests were present, including prominent bankers, lawyers and citizens from Kansas City, Liberty and Excelsior Springs, as well as directors and officers of the company.

Radio reception being one of the features of the event, a special set was installed on the special car used for the occasion. This car left Kansas City at 5:40 p.m. and arrived at Excelsior Springs at 7 p.m. During this time the 6 to 7 o'clock program of the Kansas City Star was successfully received, Western Electric loud speakers being located at each end of the 60-ft. car. Such reception was effective when the car was at rest as well as when traveling at 50 m.p.h.

On the return trip to Kansas City, the 11:45 p.m. to 1 a.m. Nighthawk program of the Kansas City Star was received satisfactorily and without interruption over the entire right of way, even through Kansas City from the city limits to the station at Seventh Street and Grand Avenue. Even when the special car was returned to the shops and run in over the inspection pits in a steel frame building the reception was unimpaired.

Following the suggestions and instructions of Robert P. Woods, vice-president and general manager, L. U. Bruner, supervisor of power and signals, designed and constructed a special receiving set for use on this trip. After exhaustive experiments a loop aerial on the roof of the car was adopted. A set consisting of two stages of radio and two stages of audio amplification was used with WD11 tubes. The aerial consisted of four turns of seven-strand phosphor-bronze wire on a frame 6 ft. square and placed horizontally on the car roof.

That satisfactory reception was secured in a steel car, especially while traveling at a high rate of speed, is all the more remarkable since the trolley wire, carrying 1,365 volts d.c., was but 5 ft. directly over the aerial. Also, the 33,000, 2,200 and 110-volt, 25-cycle, a.c. power lines were all parallel to the line of travel and all on the same poles as the mast arms supporting the trolley.

The *Star* broadcasted to its listeners-in over the continent the information that the program was being received on the moving electric car of the Kansas City, Clay County & St. Joseph Railway Company.

The Readers' Forum

Supporting Trolley Wire at Short Intervals BROOKLYN, N. Y., Feb. 5, 1923.

To the Editors:

A plan recently put into operation in one of the cities of the Middle West consists of running ½-in, galvanizediron guy wires between adjacent poles at the side of the street, so that these form nearly a continuous wire on each side running parallel to the curb line. At intervals between the poles, cross-spans are run connecting together these two parallel wires. This construction is used in an endeavor to reduce the danger from breaks of the trolley wire.

From two to eight of these additional cross-spans are installed between adjacent poles and where they cross the trolley wires they are equipped with hangers and ears and the trolley wires are supported from them. The result is that supports are provided at intervals of from 35 ft. down to 12 ft., instead of at the usual pole spacing of approximately 100 ft.

Some of the advantages claimed for the new construction are that the trolley wires are kept more nearly horizontal and that therefore there is less wear on them and consequently less liability of their breaking, and that if they do break there will not be the danger of accident due to persons or property being struck by the comparatively short pieces hanging down that there would be if a whole 100 ft. section should drop.

While the writer has not tried out this new method of construction, it would seem to be based upon wrong premises. While the increased number of ears will hold the trolley wire more nearly horizontal, yet their weight, together with the weight of the hangers and spans, will increase the number of "hard spots" in the wire, and these "hard spots" are what give the greatest trouble, because under them the wire wears faster than any other place and is therefore most likely to break. Another great cause of breakage is when the pole leaves the wire and, after striking the span wire, is caught between it and the trolley wire or some casting. In this new arrangement both the number of ears and the span wires have been increased, so that it would seem that the danger of breaks in the wire has been increased rather than decreased.

It is seldom that a trolley wire will break in the middle of a section. Most of the breaks occur either at or near ears or other castings. Therefore in only those cases where the spans are very close together, 13 ft. or less, will there be any protection to persons or horses, and even that short length would not entirely protect vehicles or persons riding under them.

Furthermore, when a long section of trolley wire falls to the ground there is at least a possibility that some part of it will touch one of the running rails and cause a heavy enough ground to open the circuit breaker in the power or substation feeding that line and thus kill the wire. If that occurs it is difficult for the station to pick it up again and stay in on the line until after the ground is removed, and it is likely that that would be done only by some one who had some knowledge of the danger of a live wire lying in the street and who would therefore either tie it up where it would not be a menace or would watch it until it could be properly cleared and repaired.

The additional wires along and across the street detract from its appearance, their installation adds to the first cost of the line, and there are many more ears and spans to care for, thereby increasing the cost of maintaining the line. It may be that the actual installation will prove to be both a life saver and a money saver, but its success would seem to be doubtful.

G. H. MCKELWAY.

Information on Steel Tie Construction Desired

UNITED TRACTION COMPANY ALBANY, N. Y., Jan. 13, 1923.

To the Editors:

We should like to obtain from roadmasters of different electric railways information as to their methods of installing steel ties, and also their opinions of these ties.

This company has during the past year installed steel ties with 95-lb. T-rail under my supervision. As this was the first steel tie construction job that I have done, I should appreciate very much hearing from others with more experience in this line.

THOMAS MURRAY, Roadmaster.

"Thought-Work-Character" Essential to Maintain Leadership

NICHOLS-LIN ERN COMPANY CLEVELAND, OHIO, Feb. 1, 1923.

To the Editors:

In your issue of an. 27 the editorial on "Work-Thought-Character" is a gem that should be constantly before the largest possible group of our population. It contains the essence of the qualities necessary if our civilization is to be continued, and must be recognized by a sufficient percentage of our population if this country is to continue its leadership.

After all, everything depends on the individual, and propaganda that advises, instructs and spurs the individual to practice Character, Thought and Work should have the widest publication.

J. M. LINTERN.

President.

Committee Formed to Foster Work of Arbitration

CHARLES M. SCHWAB, it is just announced, will head a committee of New York business men to enlist trade support for the work of the Arbitration Society of America. The purpose of this organization is to develop activities for relieving the congestion of the calendars of the courts through a clearer understanding and a wider use of arbitration in commercial disputes. This is encouraged by statute in New York State, and it is hoped by the society that there will be similar legislation in other states.

Under this New York statute, an agreement to arbitrate cannot be revoked, and a decision rendered by an arbitrator cannot be reviewed in a court of law in the absence of corruption, malfeasance or misconduct. In the opinion of many eminent judges, lawyers and business men, the statute provides the most effective means for the speedy and inexpensive settlement of practically any kind of dispute that may be made the basis of a civil action in the court. Several trade assotions have indorsed the movement.

Association News & Discussions

Co-operation May Be Stimulated*

Compulsory and Voluntary Co-operation Are Defined—The Problem of the Railway Manager Is to Stimulate the Latter

BY GEORGE E. PELLISSIER
Assistant General Manager Holyoke Street Railway

THE usual definition of co-operation is the "act of working together to one end or to promote the same object." As applied to industrial relations, this definition is just as applicable to slavery as it is to a voluntary partnership, so it is necessary to differentiate between voluntary co-operation and compulsory co-operation.

I mention this because there seems to be such a diversity of opinion as to what constitutes co-operation, not only among employees but among employers. This opinion varies all the way from the idea of the communist that co-operation means an equal division of authority and of the proceeds of collective effort, without regard to what proportion he has contributed, to the idea of some employers that co-operation means the doing by all those associated with him of what he wishes them to do. without question, without consideration of its effect upon themselves or perhaps without any other reason than he desires them to do it.

What therefore sometimes is called lack of co-operation may really be unwillingness to submit to compulsory co-operation, and what may sometimes be called co-operation is really only submissive obedience without that spiritual enthusiasm which is the very essence of co-operation. In many instances misunderstandings can be attributed to the lack of a clear conception of the difference between voluntary and compulsory co-operation.

In any analysis of the problem one of the first questions to arise is the necessity for co-operation.

Many believe, or profess to believe, that they are beholden to no one for what they need, but under the conditions of modern civilization the average individual is more dependent for his existence on the co-operation of his fellow men than the savage in the wilderness. How many of us could make the clothes we wear or alone produce the food we eat. Of what value would be the knowledge of a scientist if no one would use it, or the skill of a physician if no one would avail themselves of it. Of what use the a captain without a ship or an executive without workers?

Granted then that co-operation is not only desirable but absolutely essential under present conditions, the second question that arises is: which is preferable, voluntary co-operation or compulsory co-operation?

It cannot be denied that great things. at least in a material way, have been accomplished by compulsory co-operation. One which is fresh in the minds of us all is the building up of the German Empire and the mighty effort put forth by the German nation during the World War. On the other hand, the same conflict gave us a good example of voluntary co-operation, not only of the individuals of one nation, where the spiritual enthusiasm was exemplified in the phrase "They shall not pass," but in that of a number of nations, all imbued with the same resolve that a certain task had to be done no matter what the cost or the difficulty.

Given a stolid, persevering and unimaginative people, particularly if they are of a low order of intelligence, it is probable that with capable direction more can be accomplished not only in a material but in a spiritual way under compulsory co-operation than under voluntary co-operation, because their actions are governed by their material rather than their spiritual desires. But with an alert, energetic and imaginative people more can be accomplished through voluntary co-operation, nor is there any question that such people are capable of rising to greater heights of accomplishment than those first mentioned.

In a country like ours, in which every individual is taught to believe from childhood that he is at least the equal if not the superior of every other individual, it is footless to discuss the desirability of introducing compulsory co-operation, although it cannot be denied that there are many among us who have not yet arrived at that stage of development where voluntary co-operation may be expected.

To obtain the voluntary co-operation of your fellow men you must first be convinced that all men are subject in a more or less degree to the same emotions, desires and aspirations and as such are entitled to consideration, sympathy and a fair proportion of the proceeds of their labor. This makes it possible to obtain that voluntary co-operation which arises from the latent spiritual enthusiasm possessed by every man and which only awaits the opportunity and incentive to display itself.

In street railway work, if you please,

there is a great difference between the attitude and accomplishment of a switch greaser who feels that he is only greasing switches for a living and the one who feels that he is a vital part of an organization which is furnishing transportation. How many times have you heard some executive decrying the lack of respect for authority, the lack of enthusiasm and of loyalty on the part of the men to the organization to which they belong. Yet he himself thinks nothing of violating some law if it does not happen to please him, such as the prohibition law, for instance, and will not hesitate to tell you that the business he is connected with is going to smash. Unless the leader is enthusiastic, optimistic and courageous, particularly in times of stress, is it reasonable to expect that the other employees will be?

KEEP IN TOUCH WITH EMPLOYEES

The argument is sometimes advanced that a busy executive does not have the time to come in contact with the rank and file of the employees, but I believe he should take the time. It is of a great deal more importance to do this than it is to affix signatures to a great many reports and documents where the signature of a subordinate would do just as well and where the signature cannot mean anything more than subscribing to the accuracy or error of the subordinates whose signatures precede his or spend all his time analyzing figures.

This is particularly true in an industry like ours where from one-half to two-thirds of the gross revenue is paid out directly to labor. In many instances where there has been lack of co-operation I believe it can be traced to the actions of subordinates who perhaps without the knowledge of the executives were abusing their authority or who were not fitted to exercise the authority delegated to them.

How many times has it happend that men have advanced good ideas or suggestions only to be ignored or perhaps told to mind their own business and later see those same ideas used and exploited as original by the very ones who had refused to accept them, much less to say a word of commendation for them.

Another common failing is never to say a word of appreciation for the 99 per cent that is done well and to exaggerate out of all proportion the 1 per cent that is done wrong. How much better it is to express some recognition of the things that are done well and then to point out the thing which might be done better and the way to do it better.

It is my belief that the results obtain-

^{*}Abstract of paper presented at the meeting of the New England Street Rallway Club, Boston, Feb. 8, 1923.

able from any organization dominated by one or two individuals, no matter how capable they may be, are not comparable with those obtainable from an organization composed of men each selected and fitted for the position he holds and willing to subordinate their individual ambition for team work so that the best results may be obtained from the team as a whole rather than from any particular individual.

When the conditions of industry were such that nearly every man could see the finished product of his labor it was not difficult to arouse that pride of accomplishment to which I have referred, but today, when men are merely parts of a creative machine, in which the individual work of each one almost loses its identity, it becomes necessary to foster and develop pride in the final product of the entire organization.

The fact that men are loyal to their own organization is convincing proof to me that they are just as capable of intense loyalty as ever and that it is a reflection either on the industry or those controlling it if this loyalty has been lost.

To me loyalty to a labor organization is no more inconsistent with loyalty to a business organization than loyalty to one's wife is inconsistent with lovalty to one's mother. I see no good reason why a labor organization should not be a constructive factor in obtaining loyalty and co-operation. I believe it will be as soon as it is fully recognized that labor has just as much right to act collectively as has capital provided that each is willing to assume the obligations which go with those rights and which are all summed up in the golden rule, "Whatsoever ve would that men should do to you do ye even so to them."

Bonus vs. Recognition

I had contemplated stopping here but changed my mind after reading an article which appeared in the New York Times last Sunday setting forth the views of George Eastman of the Eastman Kodak Company bearing on this subject as given in an interview for that paper. As the views expressed are almost diametically opposed to my own it may be of interest just to refer to them. Abstracted freely, the article says; "You ask what is the solution to the problem of gaining the co-operation of employees. Every organization, every man has his own problems peculiar to his own industry, typical of his own work. You can talk about cooperation and good feeling and friendliness from morn to midnight, but the thing the worker appreciates is the same thing the man at the helm appreciates-dollars and cents. In the growth of the Eastman Kodak Company more were responsible than just the heads. It was impossible for me to go to every man and shake him by the hand and tell him that I am grateful and appreclative. First of all, I didn't want to do it; secondly, the men don't want that sort of thing. Their service to me

meant dollars and cents and a sound organization. I could appreciate that. The thing to do then, was to give them something that they could appreciate." Mr. Eastman then outlines his bonus plan. He also says: "As far as possible, all executive jobs in our organization are given to men who grew up in it." Some questions he does not answer are:

"What are the fundamental differences in industry that make the methods which are successful in obtaining cooperation in one industry a failure in another if the principles involved in getting co-operation are correct?

What happens when the condition of business is such that it is impossible to give something that competitors do not give in the way of a bonus?

What happens if on account of business conditions the employees receive a bonus this year, and next year when they work harder they receive none?

Is it always right and fair to promote a man because he himself feels he has the qualifications for the job higher up?

If you don't know your men how is it possible to obtain a fair estimate of their qualifications?

Is there any such thing as justice without knowledge?

RECOGNITION OF GOOD WORK

It is our belief that the best product of any organization is men, and that the really great things in the history of the world have not been done for money, that the greatest inducement to accomplishment by men is not money but the recognition and respect of their fellow men.

Some may say that this is idealism and is impractical in business, and that it is visionary, but it is my opinion that there is too little idealism in business, that there is a difference between having vision and being visionary.

To give a practical example of the idea which I have tried to convey I might quote recent newspaper and other expressions of commendation on work dene by our men in keeping the road open this winter in spite of the severe storms. I am sure that I am expressing the true sentiment of our men when I say that if they had their choice of a paltry bonus or this public recognition of duty well performed they would not hesitate a minute in choosing the latter, and that money alone would not have induced some of them to perform the tasks which they did,

In closing his paper, Mr. Pellissier gave the following word-picture of the type of electric railway executive and officer who does not obtain co-operation:

I. The man who whispers to a subordinate when the latter does something original or well, "You did that pretty well." The next day the former says, "That was a pretty good job acdid yesterday." A day or two later he tells his superior, "I did a job the other day that I am proud of. Of course, I didn't do the actual work, but I furnished the ideas."

2. The fellow who makes up his

mind first how a thing ought to be done, without a knowledge of the facts, and then tries to make the facts fit his conclusions.

3. The "reasonable" fellow who can always find a reason for doing what he

wants to.

4. The fellow who thinks that the other fellow's job might always be done better, but who for some reason never does his own job right.

5. The fellow who never can see the apple but who always sees the speck.

6. The fellow who perhaps has made a success in some line and because of that fact believes that he is an authority on all subjects.

7. The fellow who can criticise destructively, but who never advances

a constructive suggestion.

8. The fellow who will not say how he wants things done but expects men to use their own judgment and then condemns them if they make mistakes.

9. The fellow who tells his men, "I don't want you to do anything until you

come to me. I'm the boss, etc."

A few such joy-killers in an organization and the company is "done" as far as getting voluntary co-operation is concerned.

Discussion

The importance of friendliness in attitude toward employees, of eliminating "grouchy" employees from contact with the public, and of the careful training of subordinate officials was emphasized in the discussion. great value of explanation in destroying false ideas held by employees or the public was brought out. Greater efforts to place operating data before groups of employees were urged as essential in view of the failure of newspaper advertisements in some cases to carry the company message to the men. Those who participated in the discussion were: A. E. Potter, H. B. Potter, Ralph D. Hood, H. F. Fritch, R. B. Stearns, Alonzo R. Williams and Harry Hanson.

Executive Committee National Safety Council

A MEETING of the executive committee of the Electric Railway Section of the National Safety Council will be held in Washington, D. C., on Feb. 15. The members of this committee are: John H. Truett, chairman; G. T. Hellmuth, vice-chairman; Melvin W. Bridges, secretary; A. J. Van Brunt, chairman bulletin committee; Guy R. Radley, chairman membership committee; II. M. Keyser, chairman program committee. This meeting is called at this time as the midyear meeting of the American Electric Railway Association is to be held in Washington on Feb. 16, and a great many of the officers and members of the electric railway section will probably be present at this meeting.

The latest bulletin of the section says that the following companies have been added to the membership list of the section: Chicago Surface Lines, Menominee & Marinette Light and Traction Company, Buffalo & Lake Erie Traction Company.

Indiana Claim Agents' Association

R OR some two years past the electric railway claim agents of Indiana have had an association which meets twice a year, once in the summer and once in the winter. There are only two officers, a chairman and vice-chairman. and the meetings are most informal. The claim agent in the city where the meeting is held is secretary of that meeting and host to the association, and he automatically becomes chairman of the next meeting, while the claim agent in the city in which that meeting is held automatically becomes secretary for that meeting. A meeting was held at South Bend on Jan. 11 and about ten claim agents from other cities were present. The Northern Indiana Railway, as host, provided an excellent dinner for the association members. A number of its attorneys and other representatives of the claim department attended and R. R. Smith, vice-president and general manager of the company, made the principal dinner address.

The only official feature of the meeting was a short paper by William Tichenor, Terre Haute, Indianapolis & Eastern Traction Company, on results from the meetings of the American Electric Railway Claims Association. The speaker said that he had been attending these meetings quite regularly since 1906 and mentioned some of the changes in ideas which had occurred since that time. One was the advisability of quick settlement. This was strongly urged at one of the early meetings. Mr. Tichenor said:

meetings. Mr. Tichenor said:

I know of only one claim agent who now insists upon getting to an accident with a pocketful of money for fear that the claimant will get away from him and into the hands of what are commonly called ambulance chasers. And I know of two systems of electric railways, one large and the other small, which insist upon the claimant pursuing them to press for a settlement rather than that the claimant should be sought. The claim agents of both companies sit in their offices and await the coming of the claimant, allowing a suit to be filed, if such is the choice of the claimant, rather than go hunting for an opportunity to spend some of the company's hard-earned money.

The speaker also said that although the advantages of the Hooper-Holmes Index Bureau had been set forth at a great many meetings, very few companies used it, and a very small percentage of the whole number had done all the reporting. This was unfortunate. In conclusion, he spoke of the great advantages of attendance at conventions.

Program for Illinois Association

THE Illinois Electric Railway Association will meet in joint session with the Illinois Gas and Illinois Electric Associations in Chicago at the Hotel Sherman on March 14 and 15. Secretary R. V. Prather has announced a tentative outline of the railway section program. The two morning sessions

will be joint meetings with separate sessions of the several associations each afternoon. The joint program is to be announced later.

The program for the railway section will include a paper by W. H. Sawyer, president East St. Louis & Suburban Railway, on "The Future of the Electric Railway Business." Walter Jackson will read a paper on "The Weekly Pass System as Applied to the Chicago Elevated Railroads." C. D. Goodsell, Chicago, North Shore & Milwaukee Railroad, will read a paper on "Citizenship," presumably dealing with the spendid work being done on the North Shore Line in Americanizing employees in the maintenance of way department.

Summer Meeting C.E.R.A.

THE summer meeting of the Central Electric Railway Association will probably be held at Cedar Point, Ohio, on June 27, 28 and 29. The usual boat trip has been abandoned for this year. Arrangements for the Cedar Point meeting will be in the hands of the hotel and arrangements committee, the membership of which is announced as follows: S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio, chairman; Harry L. Brown, John Benham, James H. Drew, J. A. Donahey, C. Dorticos, L. P. Morris and E. R. Kelsay.

Traffic Association Met at Fort Wayne

ISCUSSING possibilities of further increasing through electric service between points in Indiana, Ohio, Michigan and Kentucky, delegates of the Central Electric Railway Traffic Association from about twenty-five cities met at the Anthony Hotel in Fort Wayne, Ind., on Jan. 20. It is pointed out that it is now possible through cooperation of the electric lines in the association to accept through shipments of freight from Indianapolis to Detroit and through passengers from Indianapolis to Cleveland. The next meeting of the association will be held at Dayton, Ohio, in about two months.

Transportation the Topic at U.S. Chamber of Commerce Meeting

RANSPORTATION has been selected as the principal topic of the next annual meeting of the Chamber of Commerce of the United States, to be held in New York, May 7-10. The subjects to be considered include: Railroad rate structure, the public interests and the right to strike, transportation problems in England, co-operation between waterway and railroad transportation, co-ordination between motor trucks and railroad transportation, the farmers' interest in transportation, financial support for the railroads, establishment of railroad credit, and the government and the railroad.

On the evening of May 8 a general session will be devoted to European conditions from the American viewpoint.

On the afternoons of May 8 and 9 there will be group meetings on civic development, domestic distribution, fabricated production and finance, foreign commerce, insurance, natural resources production, and transportation and communication.

American Association News

Reduced Rates to Midyear Meeting

THE committee on transportation for the midyear conference at Washington on Feb. 16, of which C. H. Beck, Westinghouse Traction Brake Company, New York, is chairman, has completed arrangements whereby delegates can travel at a rate of fare and one-half for the round trip, provided a minimum of 250 certificates are presented. order to get the reduced rate travelers must request a "certificate" upon buying the usual one-way ticket to Washington. Tickets must be purchased on Feb. 13 to 16 inclusive and not on other dates. Immediately upon arrival at Washington these certificates should be presented at the registration desk, where they will be indorsed by Secretary Welsh and later validated by a special agent of the railroads, if 250 certificates are presented. Delegates are urged to secure a certificate and turn it in at Washington even though they plan to return over a different route than that taken in going to Washington, as the certificate will help in obtaining the minimum requirement even though the reduced fare cannot be had by the person returning over a different route.

Program for Ladies at Midyear

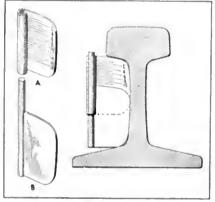
PROVISION has been made by the dinner committee for the entertainment of the ladies who will attend the midyear conference as follows:

A tea and reception will be held on Thursday afternoon at either the New Willard or Washington Hotel. Thursday evening there will be a theater party. Friday morning the ladies will be taken on a sight-seeing tour of Washington, and at noon there will be a luncheon at the City Club. Friday afternoon they will be taken on a trip to Mount Vernon and Alexandria by special car over the Washington-Virginia Railway. For those who do not care to go to Washington's homestead there will be tea and cards at either the New Willard or Washington, or a further sight-seeing tour around the District. Friday evening the ladies will be served dinner in the small ball room at the New Willard, and thereafter those who care to hear the speeches will go into the main banquet hall, or tickets will be secured at the leading theaters for those who prefer this form of amusement.

Maintenance of Equipment

Gage for Determining Space Available for Angle Bars

way of St. Petersburg, Fla., have a large variety of makes of rail, varying from 50 lb. to 80 lb. in nearly all sizes and shapes. One line in particular that was built of relaying rails that were never properly graded before laying has all varieties. Very often it is desirable to know the approximate size of the angle bars that are needed at various points. In order to determine this



Gag+ for Rall Angle Bara

readily, a gage has been devised by J. S. Wilder, engineer maintenance of way department, as shown in the accompanying illustration.

This is made of two copper strips. One edge of the lower one, shown at B. is bent around a stiff steel wire in a vise. A corresponding edge at A is also bent, but to a slightly larger diameter than that of B, so that the bent portion of A can be slipped over that of B. A reasonably close fit should be secured between the round parts. It will thus be seen that the two parts can slide over each other and form a gage to indicate the space available for an angle bar. The part marked A has a scale of gage marks on it. The line marked at 8 was first located, that being the size of an angle bar for a 60-lb. A.S.C.E. Divisions were drawn each side of the 8 mark every sixteenth inch. By placing this gage in posttion and noting the readings on the gage, the proper size bar can be readily determined. It should be noted that the rounded corners

HE lines of the Municipal Rail- which fit against the rail should have a larger radius than that of the rail section to overcome any variations in the shape of the various rails. several gages are made exactly alike, the track foreman can send in for an angle bar of a certain size and boring as required. He also can indicate when one end of the bar should be ground off to some other size.

Chattanooga Signal Failures **Show Further Decrease**

COMPARISON of signal fail-A ures for the Chattanooga Street Railway for the years 1919, 1920 and 1921 was given in the ELECTRIC RAILWAY JOURNAL for March 18, 1922. A report from this company giving similar data for the year 1922 has just been issued, and a table herewith gives a comparison for the four years.

The company has forty-two Nachod signals in operation, most of which were installed fourteen years ago. The continuous reduction in the number of signal troubles which have occurred is shown in the accompanying table and indicate the care with which maintenance is carried out.

A comparison with the year 1921 shows that the number of cases of trouble of each kind were either the same or fewer during 1922, except for the items "Lamps Out" and "Setting Contactor." The trolley contactor failures are nearly all due to flying trolleys, and as such are not under the jurisdiction of the signal department. The burning out of lamps is the most frequent single trouble, constituting 22 per cent of these. In the future new lamps will be inserted periodically in the signals, whether they burn out or not, after the average life of a lamp in the signal has been determined. It is expected that this regular replacement of the lamps will greatly reduce the number of lamp outages.

There were only eleven failures due to relay trouble, and while some of these may have been due to the relay itself, others were brought into the relay through line failures, grounds, crosses, etc., whereby the relay was damaged. Since there are forty-two relays in service, this is equivalent to one case of relay trouble in nearly four years.

In 1922 there were eight-six cases of trouble arising from a total number of signal operations for the year of 2,082,404, which is 24,214 signal operations to one signal failure and 30 per cent better than 1921. The passage under a trolley contactor is counted one signal operation. Stated in another way, there were only two failures per block per year from all causes. It will be noted that the signals also made more total operations during 1922. There was one period extending over twenty-three days when there were no failures.

As a part of the year's maintenance work, the signal department rewired seven signal poles by approved methods, using conduit, new fuse boxes and cable supports for distributing the leads: thirty overhead contactors were taken down and replaced with others previously overhauled and painted; seven relays were overhauled, rewired and made as new; new oil was placed in thirtysix signals, and three Cheatham switches were installed,

COMPARISON OF SI	GN	AL TROUT	ALES		
Trouble found		1919	1920	1921	1922
Line wires .		. 8	13	5	3
Fuses blown		29	16	9	9
Lamps out		24	34		19
Relay trouble Setting contactor		24	22	- 12	- 11
Restoring contactor . Restoring contactor		19	5		5
Bad grounds		9	2	6	1
l'ole wiring		10	ì	13	13
No trouble found		13	20	14	12
Miscellaneous		20	10	8	3
Totala		156	143	94	86
		1919	1920	1921	1922
Total operations of all signals for year		1.745,950	1,709,820	1.759.300	2,082,404
Number of operations per failure		11,336	11,954	18,714	24.214
Average yearly operations of each block of signals		96.986	85,490	97.964	99,162
Average daily operations of leach block of signals		264	276	240	272
Number of blocks in service		18	20	20	21

Kansas City Railway Tries Ratchet Hand Brake

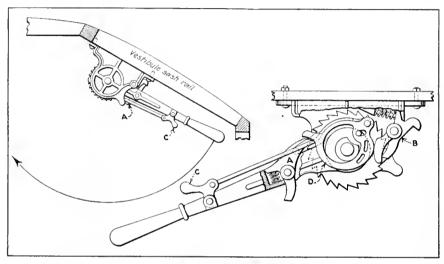
THE accompanying illustrations show a new type of hand brake mechanism which has been in service on a car of the Kansas City Railway for the past seven months. Its use is now being extended to other cars of the system. The new mechanism consists only of an operating head and the same hand brake staff and brake rigging is used as previously. The new operating mechanism is applied by cutting off the top of the old brake staff and providing this with a square end to set in a socket of the new mechanism.

In the running position with brakes fully released the operating handle occupies a position to the right and against the front vestibule of the car. To apply the brake the operating lever is pulled forward to the left, which at the same time moves a ratchet wheel which forms a part of the mechanism. As the ratthet wheel is fastened to the brake staff this movement winds up the brake chain at the bottom end in the usual manner. By referring to the accompanying illustration it is seen that the ratchet is made to revolve when the operating lever is pulled to the left through a pawl, A, and is retained in position by a second pawl, B, so as to prevent any back motion. In case one forward sweep of the lever is not sufficient to apply the brake, the lever can be pushed back and again pulled forward until the required braking effort is obtained. If it is desired to release the brakes entirely, the operating lever is pushed to the right so as to occupy a position against the front vestibule. The release is accomplished through the end of pawl A, engaging in the notched portion of the pawl B, which tilts the latter pawl back and disengages it from the ratchet wheel, which allows the wheel and shaft to rotate and fully release the brake. The pressure on the end of the operating lever necessary to move the pawls for release is about 25 lb. When in the release position the locking pawl is held clear of the ratchet wheel for a distance of approximately ½ in. This prevents stripping of the teeth on the ratchet wheel.

With the brakes applied and the handle in the forward position, if it is desired to ease off the pressure without fully releasing the brakes, this is accomplished through the action of the thumb latch marked C. The thumb latch is connected through a link to a cam which is socketed about a boss on the operating lever. This cam, marked D in the illustration, has a slot in which a pin on the operating lever slides. This permits the cam to be moved forward and backward by the

go of the lever while it has the strain of the brake, the thumb latch would be released and the locking pawl would immediately engage the ratchet wheel, so as to prevent further movement or release of the brake.

A friction retarding wheel also constitutes a part of the mechanism. This fits around the brake shaft and revolves as a unit with the shaft. This retarding wheel prevents the brake shaft and chain from spinning off in making a full release. The action of the operating lever in its



Hand Brake Operating Mechanism

action of the thumb latch. The movement of the cam D acts on the pawl B so as to disengage this, and the ratchet being then held by the pawl A can be moved backward to any extent desired. The releasing of the thumb latch causes the locking pawl B to again drop into position and retain the ratchet in the desired position.

The operation of unlocking the ratchet wheel is accomplished with very little effort, since the pulling of the lever forward removes the pressure from the locking pawl B, so that all the strain from the brake is carried on the lever and the pressing down of the thumb latch C rotates the cam and forces the locking pawl to a disengaged position. When the brakes are released to the desired degree, the removing of the thumb pressure from the latch allows the cam to return to its released position through the pressure of a spiral spring. The brake can thus be eased off as the car comes to a stop in the same manner that is accomplished by the use of straight air brakes. There is no danger of the lever flying back while it has the braking movement to the right causes the lever jaw to be forced against this friction wheel so as to prevent too rapid unwinding of the chain. The hand brake mechanism was worked out and has been patented by Charles C. Crewson, who is connected with the railway company.

All Cars Equipped with Sleet Cutters

IN ORDER to provide for quick installation of sleet cutters in case of necessity, the Holyoke (Mass.) Street Railway has installed a spring type sleet cutter in the front vestibule of each closed car. These are fastened with a wing nut so that they may be removed without the use of tools.

degree, the removing of the thumb pressure from the latch allows the cam to return to its released position through the pressure of a spiral spring. The brake can thus be eased off as the car comes to a stop in the same manner that is accomplished by the use of straight air brakes. There is no danger of the lever flying back while it has the braking pressure, as should the operator let

are turned in to the carhouse foreman, who replaces them with new The foreman also sees that

when removed are in good condition every car is equipped at all times they are put back in the vestibule in with one of the sleet cutters until their original location. If not, they the season of ice storms is over, when they are removed and put in the storeroom until the following winter

New Equipment Available

Machine for Cutting Gaskets

LECTRIC railways use a considerable number of gaskets, but frequently the quantity used of any particular type does not warrant the expense of having a die made. meet the requirements for a machine which can cut one or a quantity of gaskets at one time, depending on the thickness, and eliminate a large investment in idle dies the International Register Company, Chicago, Ill., is marketing a machine called the "International Cutawl." The mechanism provides for the operating of a small chisel making 2,000 strokes per minute by a small Universal motor. At the top of each stroke the chisel leaves the work and the stroke may be adjusted for any thickness of material up to ½ in. The high speed assures a smooth edge on all materials and the machine can be used for cutting stencils, felt rings. cardboard and thin wood patterns. It cuts all gasket materials, even copper and the wire insert asbestos kind.

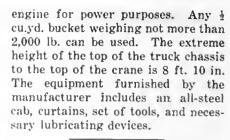
The weight of the machine is 19

lb. and the cutting range is 24 x 48 in, at one setting of the clamp. The height of the machine from the table is 16 in. The machine is equipped with a 1/20-hp. Universal motor, which can be used on either alternating or direct current.

A Crane for Mounting on Trucks

O MEET the demand for a type I of crane which can be mounted on a truck and used for handling material in yards and at new construction where the usual type of car crane is not adaptable, a new type is being marketed by the Byers Machine Company, Ravenna, Ohio.

The crane has a special base to accommodate mounting on a truck. Unmounted the crane weighs 6 tons. Any 5-ton or larger truck having a minimum chassis length of 8 ft. 10 in. from rear of driver's seat to the center of the rear axle can be used for the mounting. The crane is provided with a power drum for raising and lowering the boom, which is made of steel, and is furnished with a Hercules four-cylinder 4-in, x 5-in.



Switch-Thawing Outfit

THE Aeroil Burner Company, Ine., Union Hill, N. J. announces several additions to its line of thawing outfits. A new type has the burner directly attached to the upright



Thawing Outfil

tank so that the hose connection is unnecessary. A windshield or hood has also been developed to prevent the extinguishing of the flame during severe weather. The direct connected torch has a 3-gal. steel pressure tank with rigid handle. The tank is made of welded steel tinned inside and outside and is tested at twice the working pressure of the torch. The upright construction permits the use of a large pump having a rigid handle and a stroke of 10 in.

Two sizes are also furnished with hose connection. One has a 3-gal, tank with a torch flame 21 in. in diameter and 30 in, long, and another has a 5-gal, tank with a 31 in. flame, 30 in. long. Electric railways find these torches useful for thawing out frozen conditions about tracks and rolling stock.



Handling Crushed Stone in a Rallway Vard

The News of the Industry

Vote on Paving

Plan to Relieve San Diego Railway of Paving Charge to Go to Vote at Primary in March

Citizens of San Diego are again to be given an opportunity to vote on the question of whether the San Diego (Calif.) Electric Railway is to be relieved of the obligation to pave between tracks on new work that may be put in. The opportunity will be presented in the form of a charter amendment to be voted on at the regular city primary election on March 20. The proposed charter amendment is more lengthy and detailed than the one, aiming at the same purpose, which was defeated by a very narrow margin at a special election Oct. 10 last. The new proposed charter amendment originating with members of the City Council was drawn by the city attorney and was ordered placed on the ballot at the meeting of the City Council on Jan. 29.

The proposed section of the charter in part reads:

The proposed section of the charter in part reads:

The owner of the franchise or privilege shall at all times keep that portion of the street occupied by his or its tracks in good condition, constantly in repair, flush with the street and with good crossings; and in the event that the street on which said franchise or privilege is granted shall be paved, either by the city or under proceedings authorized by the general laws of the state, the said owner of said franchise shall be required to pay for only that portion of any construction in excess of that covered by the specifications for improvement of the rest of the street, and which shall be necessary to provide a safe and suitable foundation for the operation of car lines on a paved street. It is the intent and purpose of this section to relieve the owner of a franchise or privilege to operate street cars on the streets of the city of San Diego of the cost of new surface pavement between the tracks of said owner and for two feet on either side thereof on streets to be hereafter paved, and to require the owner of said franchise or privilege to lay a suitable foundation for the operation of car lines over a paved street.

In the event that a street on which a franchise under this section shall have been granted shall be paved or improved under any of the general laws in force at the time said improvement is started, the property owners shall be required to hear the entire cost of the improvement of the street, including the cost of the improvement of the street, including the cost of the provement of the street occupied by the owner of the franchise as hereinbefore provided.

\$650,000 for New Grades if Railway and City Will Help Pav Cost

The Illinois Central Railroad has announced that it will expend \$650,000 for a new grade through the city of Champaign, Ill., and for the erection of a modern three-story station for Champaign, if the city of Champaign and the Urbana & Champaign Railway, Gas & Electric Company will each pay one-third of the cost. The station will cost \$300,000. It will be directly served by cars of the street railway and also of the Illinois Traction System, the parent company of the electric railway.

The raising of the steam railway

tracks and the construction of a subway at University Avenue would eliminate a dangerous grade crossing which all street cars of the Urbana & Champaign Railway, Gas & Electric Company and all freight and passenger cars of the Illinois Traction System must pass. As street car service between Champaign and Urbana and also to the campus of the University, mid-delaying street cars throughout the day,

way between Champaign and Urbana. is very heavy, the building of a subway would be a long step forward in the safety program so generally in vogue now. The interurban cars and freight trains would also be benefited by the subway under the Illinois Central Railroad. This grade crossing is the cause of great congestion at the present time,

Wants Commission Abolished

Mayor Schwab of Buffalo Sees Neglect of Railway Situation-Commission Blames City and Makes Recommendations to Railway —Use of Additional Buses Suggested

FOLLOWING closely upon the recent report of the Public Service Commission fixing on the Mayor, City Council and city authorities a good part of the blame of the poor transit service in Buffalo, Mayor Schwab has written a letter to Governor Smith urging him to ask for the resignations of William A. Prendergast and Colonel William R. Pooley from the Public Service Commission or to abolish the commission for not relieving the railway situation where a strike of employees has been in force since July,

The recommendations of the commission followed an investigation by that body of a complaint over Buffalo's car service made on Jan. 5 to Governor Alfred E. Smith.

In the Mayor's opinion the report and the apparent neglect in solving the railway situation are sufficient grounds for abolishing the commission or at least demanding the removal of Messrs. Prendergast and Pooley. The report was written by Chairman Prendergast after a three-day hearing in Buffalo by the chairman and Commissioner Pooley. Twenty-two witnesses were examined, 652 pages of testimony were recorded and thirty exhibits were introduced.

Mayor Schwab in his letter of Jan. 5 made nine complaints against the railway charging insufficiency of cars, employment of inexperienced men, nonestablishment of regular schedules, disobedience of health department rules, shortening routes, thereby causing inconvenience to passengers; failure to provide "owl" service, failure to render service to the so-called Bailey-Kensington district, failure to anticipate snowstorm on Dec. 28, and failure on the part of the company to make any extensions for years.

Answering the charge of the city that normal service had not been restored in Buffalo since the outbreak of the strike on July 1, 1922, the commission says the company now has a force of 2,051 trainmen compared with 1,711 on the day the strike was declared, and that 1,400 of the new force are local men. The commission says, however, that the labor turnover in the last six months has been 106 per cent.

It was the contention of the commission that the company was at present operating 95 per cent of last year's service as measured in quantity of carmiles, that there was being carried at present about 85 per cent of the number of passengers carried last year, so that the quantity of service in car-miles exceeded that of last year. Rather was it incumbent upon the city authorities who control the streets to reduce the congestion and in that way enable traffic to flow with greater convenience to the public.

On the charge that no extensions of the lines had been made in recent years the commission brought out the fact that the company had no franchise permitting it to make any extensions. Further, the commission ruled that it might well be that there were certain sections which should be served by extensions, but the complaint of the Mayor came at the very time when the Mayor and his associates in the Council were threatening the life of the railway company by the indiscriminate competition of buses.

The nine recommendations to the city authorities urged "that the Mayor and the Council of the city are under a public obligation to co-operate with the railway company in securing satisfactory street car service." The Mayor is asked to direct the police department "to prevent undue and malicious interference with the operation of street cars by drivers of automobiles and other vehicles and that the energies of the police department be more intensively used to prevent a recurrence of outrages against employees and property of the railway company, proof of which was furnished in this proceed-

The city is also urged to revise its parking ordinances to improve present street car and automobile congestion in the business section and increase the

number of one-way north and south streets. Enforcement to practicable limits is urged of ordinances relating to slow moving or standing automobiles, held to be one of the contributing causes to Buffalo's unsatisfactory street car service. Co-operation between the company and the city to bring about more efficient snow removal is also recommended.

The street car company is directed to add forty-five cars to its present service: equip all cars with route and number signs; to retire certain snow-fighting equipment; to reroute various lines to better service; to construct connectng track on west side of LaFayette Square to improve service on east side lines; to improve service on Kensington Avenue, east line, by adding additional buses during the rush hours: to build shelters at Kensington and Federal Avenues; to secure city consent to operate buses in Bailey Avenue until the company's financial condition will permit track reconstruction; to consider eliminating car stops when less than 500 ft. apart; to permit city passengers to board inbound interurban cars when they stop to discharge passengers.

Parking Regulations Hamper Car Operation

Former Judge H. G. Wasson, as special master, has submitted a report to the receivers of the Pittsburgh (Pa.) Railways showing the effect of the city's parking regulations on car operation. The report contains the results of an analysis of street conditions during the rush hours and shows that about 25 per cent of the passenger-carrying capacity is hampered by the parking of automobiles at points of particular congestion.

The report points out how the Council might modify the parking regulations to prevent the inconvenience of thousands of car riders and at the same time help thousands of automobiles moving during the rush hours in congested districts to reach their destinations with less delay. Mr. Wasson believes that what is best for the greatest number ought to be the rule in determining regulation of street traffic.

Power of Commission Attacked

The city of Pomona, Calif., in a brief filed with the California State Railroad Commission on Jan. 13 attacked the right of the commission to abrogate a contract made by a municipality with a public utility.

For some time the Pacific Electric Railway has endeavored to obtain permission to abandon its local lines in the city of Pomona because they are not paying. The City Council of Pomona refused permission to the company and the railway appealed to the commission, which ordered the city to submit its side of the case. The railway company's franchises for its city lines in Pomona were granted in 1910 for a period of fifty years.

Governor Smith Speaks Again on Home Rule

New York Executive Says State Regulation Has Failed—Half a Dozen State Appointees Cannot Be Permitted to Determine How the Affairs of a City of 6,000,000 People Are to Be Run

GOVERNOR SMITH of New York addressed the Board of Trade and Transportation, New York City, on Feb. 3 and reiterated points taken up in his gubernatorial address favoring the abolition of the New York Transit Commission and the regulation of the utilities by the municipality. The Governor's stand on this matter, as set out in his inaugural address, was given at some length in the ELECTRIC RAILWAY JOURNAL for Jan. 6 and commented on in an editorial in the same issue.

In this more recent address the Governor reviewed the history of utility regulation in New York and pointed out as one indication that state regulation had failed the fact that there have been some fifty-six different commissioners appointed. He said that no one had ever been able to explain to him upon what theory regulation should be a state function.

He made the point particularly that there is a good business reason why New York City should have the power to construct its own subways without interference from the State. The present arrangement gives a division of responsibility. The major power in such matters rests by constitutional law with the city. Only minor power lests with the State. Good business sense suggests that these be put together so that somebody can be held responsible and so that there will be some one whose sole job it is to enlarge the transit system of the city. He said it would take three years to take the power away from the city and lodge it entirely in the State, and he was not sure whether this could be done at all. The State Constitution provides that the city is the final authority in permitting any use of its streets. That provision was put into the Constitution to safeguard the interests of municipalities from legislative interference with what the people themselves believed to be the power and the property of the municipality.

The Governor said that if that is true, then the next thing to do is to lift the minor power away from the State and put it over where the major power is, so that the people in the city will be able to know to whom to look to get subways. The present divided responsibility makes the people look to the State to accomplish the desired end when the State has only the minor power.

The Governor said that the theory upon which the State attempts to regulate public utilities is the exercise of what is called the police power. The State does not exercise this power itself, but confers it upon a commission.

The theory behind that is that these utilities use the public highways, and, in the last analysis, the title to the public highways rests with the State. He said he had no quarrel with that doctrine as a doctrine. His quarrel is that it has not been successful, largely because of the agency. Now, he asks, what harm can come by transferring that agency to the elected representatives of a municipality, and let the question of proper regulation become an issue. "Let us have a chance to vote for men who are going to exercise that power," was his remark. "If there are any ills that democracy is suffering from today, they can only be cured by more democracy. It is all right to argue some constitutional principle, and talk about some divine right or constitutional right. But you have got to reckon in this city with 6,000,000 people. You cannot let a half dozen men determine how the affairs of these people are going to be run."

The Governor then made the point that the people do not know the public service commissioners, that they come suddenly into office over night and have authority in the fixing of great policies that have to do with the comfort and convenience of millions of people. These are matters that the Governor says must be determined by the people themselves, through their expression at the polls in electing municipal officers.

Double-Truck One-Man Cars in Operation

The Cincinnati (Ohio) Traction Company put into operation five one-man cars on Feb. 1. The cars, which were built at the plant of the Cincinnati Car Company, are unique in many details. The control equipment is a Westinghouse multiple-unit type, designed to permit the operation of the cars in trains, with the motorman controlling There are all cars simultaneously. nine cross seats on each side of the car and scats running lengthwise both in front and in the rear, giving the car a total seating capacity of forty-six. The front door, through which passengers must enter the car, is operated by air pressure and interlocked so that it is impossible to start the car until the door is closed and impossible to open the door until the car is stopped.

Eight of the new type cars will shortly be started on one of the suburban lines, which later will be equipped with twenty-two of these cars. It is the intention of the traction company to have fifty "one-man cars" in operation March I.

The Cincinnati Car Company is building seventy-five of these new type cars for the traction company. The order was placed last fall.

Warrants Being Cashed

Temporary Relief Provided—Ordinance Appropriates \$41,000 from the Depreciation Reserve Fund

Warrants issued for January pay of employees of the Seattle Municipal Railway and for railway supplies are being cashed by Seattle banks, following adoption of a City Council committee resolution which met the bank's requirements regarding the provision of funds to retire the \$231,533 in warrants. The resolution was framed by the Seattle Clearing House Association and was passed by the unanimous vote of the Council. It provides that, beginning Jan. 30, no legislation shall be adopted that will result in appropriations from the city railway fund, except for the purpose of paying outstanding city railway fund warrants. It also provided that "daily receipts of the railway be placed in the fund and remain until the warrants are paid in the order of their issuance." In addition, an ordinance has been introduced appropriating \$41,000 from the depreciation reserve fund, to be placed to the credit of the fund against which the warrants are issued.

The decision of the Seattle Clearing House Association was outlined after several days' sessions, during which the association refused to cash the Municipal Railway warrants and employees were unable to obtain their wages.

The association based its refusal to cash warrants on the inability of the street car system to meet expenses on the 5-cent fare basis scheduled for March 1. Its statement said:

At the reduced fare of 5 cents, with the 1½ cents additional for transfers, allowing for a 15 per cent increase in the number of fares, with no additional increase in expenses, the estimated receipts will be \$14,000 a day, or \$3,000 less per day than is sufficient to meet the needs of the system.

Cashing of the January warrants is looked upon by Mayor E. J. Brown and the city bankers as merely temporary relief, as another issue of warrants to the amount of \$123,000 becomes necessary on Feb. 10. Mayor Brown believes this issue will bring the city a step nearer the inevitable "showdown" which he says must come on the "impossibility" of the purchase contract between the city and Stone & Webster. Mayor Brown said he was in favor, after March 1, of using the earnings necessary for operating expenses before taking care of the bond redemption and interest. Funds of the street railway department should be kept separate from all other funds of the municipality, he said, and the ordinance requiring an appropriation from utility funds each month for bond redemption and interest should be amended to exclude the street railway department.

That Mayor E. J. Brown is deliberately inviting a law suit from Stone & Webster for specific performance or default on the contract for the purchase of the Seattle street railway lines is the opinion of Councilman E. L. Blaine, chairman of the Council finance committee.

With the 83 cent fare, the Seattle

Municipal Railways would be on a cash basis again early in March, according to Allen B. Hiatt, chief accountant in the railway office. As it now stands, as soon as the Jan. 25 issue of warrants for salaries and supplies is redeemed a new issue of approximately \$123,000 will be out on Feb. 10, followed by another larger issue on Feb. 25 of about \$225,000. Considering the 5-cent fare after March 1, Comptroller H. W. Carroll's statement to the clearing house recently shows a possible warrant indebtedness on Dec. 25 next of \$1,138,000.

A net profit of \$690,153 was made by the railway in 1922, according to the annual report of D. W. Henderson, superintendent. The income profit and loss account follows:

Gross operating revenue Less operating expense (deprecia tion of \$685,114 included)	-		
Operating income	er.		
Total Less net loss on property retire ments, etc	-		
Total	. \$1.	531 834	$084 \\ 157$
Total	. \$		926
Net profit Total charge to expense for depreciation Less amount transferred to depreciation reserve fund out of rail way earnings	. \$	690 688 260	,114
Amount included in railway oper ating expense, but allowed t remain in operating fund to b used for redemption of bonds purchase of stores, betterments etc. Add net profit for year show above	o e s. s.	425 690	,114
Earnings in 1922 which might b nsed for bond redemption an betterment or extension of sys	d i-	110	

Through Service Again Sought

tem\$1,118,267

As the result of a conference at which were present Maurice E. Connolly, Borough President of Queens. Gen. Lincoln C. Andrews, receiver of the New York & Queens County Railroad, and S. W. Huff, receiver of the Steinway lines, it was agreed to establish a through service from College Point and Flushing to Long Island City and New York, if the Commissioner of Plant and Structures would replace the car tracks at the Fifty-ninth Street, Manhattan entrance of the Queensborough Bridge. These tracks were torn up several months ago. Passengers now must change cars and pay an additional fare at Woodside, due to the splitting of the Steinway lines from the New York & Queens County Railroad. It is believed that Borough President Connolly will ask Commissioner Whalen for restoration of the tracks.

Conference of Union Employees Called.—A New York State conference of union electric railway employees will take place on Feb. 12 at Utica, with the purpose in view of organizing a representative body for 1923. It is said that one-man cars will be discussed.

Will Submit Bond Issue

Detroit Voters Will Be Called Upon Again to Approve Money Provision for Railway Improvements

A bond issue of \$5,000,000 will be submitted to the voters of Detroit at the March primaries to provide money to be used for street railway improvements and extensions. Favorable action was taken on the proposal by the City Council after the Street Railway Commission had agreed to ask again for the bond issue which failed to pass at the last November election. When the proposal was submitted before, it was believed by the street railway officials and former Mayor Couzens that its failure to pass was due to the fact that it had not been thoroughly understood by the voters.

While something more than \$1,000,-000 of the \$15,000,000 bond issue voted for the municipal street railway system in 1920 is still unused, this will probably be supplied in payment for the Peter Witt cars, 200 of which have already been ordered and 106 have already been received. If the bond issue is passed, it is planned to complete payment on the 200 cars ordered, purchase additional cars and proceed to carry out an extension program contemplated for the city. Several trailers are now being built in the city-owned shops in Highland Park acquired from the Detroit United Railway.

According to Ross Schram, assistant general manager of the Department of Street Railways, the street railway department is paying for equipment more quickly than is customary with private corporations, as five years are often required to make complete payments.

Although the 2 per cent bonding limit for the city of Detroit based upon the 1922 valuation has been practically reached, an increase in assessed valuation amounting to \$100,000,000 in this year's assessment is expected to provide for further bond issues. As it has been felt that the city's bonded indebtedness should not be limited to 2 per cent of its assessed valuation, preliminary steps have been suggested to have the limits raised to 4 per cent. In stating that the Department of Street Railways must expand in the near future to meet the needs of a fast growing city, Mr. Schram explained that such expansion can only be financed as any public utility corporation would do in a similar situation through the sale of securities.

A report has been turned over to the street railway department by W. E. Ruff of the Department of Public Works recommending the construction of a loop line to circle the heart of the city and tap the main lines outside of Detroit's congested district. A survey of the proposed line has been made, indicating that it would require the construction of 1½ miles of double track.

The proposed line would run north from the intersection of Jefferson Avenue and Third Street, to Elizabeth Street, then east and south, connecting with Jefferson again at St. Antoine Street. The loop, the estimated cost of

which is placed at \$500,000 would if constructed, provide an opportunity for passengers to transfer to the trunk lines without entering the congested area at the heart of the city.

The possibility of a new street car line to be financed by Henry Ford, and connecting the present Department of Street Railways line with the Ford blast furnaces at River Rouge, has been discussed by the street railway commission and Ford Motor Company officials. Expansion of the Ford interests in River Rouge and Springwells and Dearborn are considered as making a construction of such a line necessary in the near future. The possibility of the villages of River Rouge and Springwells taking part in the financing of the project has been brought up.

Cars would be operated over the line by the Department of Street Railways and the lines would eventually pass into the possession of the department, according to the proposed agreement. This agreement whereby the city would acquire ownership of the line when it was ready for such step would be arranged whether the line was financed by Mr. Ford alone or with the co-operation of the villages.

According to Mr. Schram, the city has hesitated to consider extensions outside the city limits to River Rouge, financed by the city, because of the number of sections desiring extensions within the city. The Ford industries contemplated are expected to result in a new residence and business section containing in the neighborhood of 150,-000 people.

Damage Claim Plan Approved in Pittsburgh

The City Council of Pittsburgh, Pa., has unanimously given its consent to the settlement of individual injury claims against the Pittsburgh Railways, Under the plan each claimant will be given the choice of either the ten-year installment or the cash-discount plan of payment. Those who accept the cashdiscount idea will be paid "at the then value" of the claims. The present value has been estimated at about 76.6 per cent on the dollar of judgments for damage claims.

The reorganization plan of this property has been hanging fire now for some time due in large measure to the inability of the company and the claimants to come to an agreement on the point of payments. The Council some time ago called on H. Fred Mercer, attorney for a number of persons holding judgments against the company, to state his case. He had stood firm for a guarantee from the Philadelphia Company that the money would be paid. A. W. Robertson, vice-president of the Philadelphia Company, later informed the Council that his company would not object to the plan since it did not affect the ten-year installment plan, but merely speeded up payments. The Council concurred in this agreement. Immediately after this another delay was caused by an announcement to the

Council by C. K. Robinson, special assistant city solicitor, that 15 per cent of the damage claimants had not agreed to any plan of payment. The resolution as now agreed upon has received official acceptance by the Philadelphia Company.

Invitations Issued to Participate in Coffin Award

Frank W. Smith, as president of the National Electric Light Association and Chairman of the Charles A. Coffin prize committee of the N. E. L. A., has issued a letter to all central stations in the country inviting them to participate in the awards to be made under the terms of the Coffin Foundation as established by the General Electric Company and announcing further details of these awards.

All statements must be in the hands of the committee by March 15, 1923. They are to be addressed to the Charles A. Coffin Prize Committee of the National Electric Light Association at 130 East Fifteenth Street, New York City. The details of the Charles A. Coffin Foundation were given in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 9,

Strikers Sentenced for Disorders

Five striking platform employees of the International Railway, Buffalo, N. Y., have been sentenced to from two to four months each in the Erie County Penitentiary by County Judge Noonan. The men were convicted of stoning cars during the early days of the strike. Another striker was convicted of the charge of assault and was sentenced to one year in the penitentiary. He was accused of firing a shot at an employee of the company.

Frank W. Reilly, a striking platform employee of the International, who was indicted with twelve others on charges growing out of the dynamiting of the Buffalo-Niagara Falls high-speed train last August, has surrendered to the federal authorities. Reilly is the only one indicted who failed to give himself up immediately. He was released on

\$15,000 bail.

News Notes

Must Answer Complaint Charges .--According to an order of the Public Service Commission the Schenectady (N. Y.) Railway will be required to appear before that body and answer complaints as to service conditions on the Albany-Schenectady divisions of

Subway in Prospect .- It is said that an agreement has been reached between the city and the Memphis (Tenn.) Street Railway whereby the work on constructing the subway on Linden Avenue will soon be undertaken. Electric railway cars on this avenue will be rerouted.

Date for Hearing on Bills Set,-The date for a joint legislative hearing on the State fund bill of the Lockwood housing committee has been set for Feb. 13. Other bills to be heard on that day will be the one regulating the disposition of stock investments of insurance companies and the bill creating a trade and commerce commission and the measure regulating the activities of trade unions.

Recount Defeats Municipal Ownership .- A recount was taken recently on the vote east on Jan. 1 by the public of Ottawa, Can., on the purchase by the city of Ottawa of the Ottawa Electric Railway. The recount showed a defeat for the purchase plan by forty-nine votes. On Jan. 1 both the proposed service-at-cost contract and the municipal ownership questions were turned down by the people.

Courtesy Counts .- G. J. Kuhrts, general manager of the Los Angeles (Calif.) Railway, has emphasized in an official bulletin that courtesy will become one of the outstanding factors in determining a man's efficiency record and the amount of bonus he will receive in 1923. It is the company's aim to give Los Angeles the most courteous car service of any city in the United States.

Interest in Big Extension.-Much interest is centered just now in the proposed extension of the lines of the Chattanooga (Tenn.) Traction Company from a point near the Signal Mountain to Crossville to connect with the Tennessee Central. It is said that if the line is constructed it will probably be electrified. In the approximate length of 90 miles the proposed line would make it possible to develop an area of 350,000 acres, containing a billion tons of coal.

Blame for Accident Shared. - An agreement has been reached between the Louisville & Nashville Railroad and the Louisville (Ky.) Railway whereby each will assume an equal responsibility for the wreck on Jan. 19. The accident occurred at Twelfth and Magnolia Streets when a Louisville & Nashville switch engine crashed into a street ear. Eight passengers were injured besides the motorman, who is perhaps fatally injured. The details of the necident were given in the ELECTRIC RAILWAY Journal, issue of Jan. 27.

Tulley Talks in Print, - "Tulley Talks" is the name of a new publication being circulated among employees and to the public by the International Railway, Buffalo. The publication is named after Herbert G. Tulley, president of the International. The first issue recalls the suffering experienced by Buffalo because of union domination. There is a brief outline of Mitten policies and an explanation of the Mitten plan of operation and co-operation which has been put into effect in Buffalo. Editorials from various publieations of national circulation commending the Mitten plan also are included in the first issue.

Financial and Corporate

American Public Utilities Company to Reorganize

A plan for the reorganization of the American Public Utilities Company, Grand Rapids, Mich., has just been sent to the stockholders. The plan provides for the elimination of the 6 per cent preferred stock through its exchange into new prior preferred 7 per cent and 6 per cent participating preferred on the basis of three-tenths share of the prior preferred and eighttenths share of the participating preferred for each share of the present 6 per cent preferred, with its right to accumulated dividends, and the dividend scrip or accrued dividend notes. Where the present holders of the 6 per cent preferred are not owners of scrip or dividend notes they will be required to pay the sum of \$7.50 in addition to surrendering their stock for exchange.

The management announces the payment of dividends beginning April, 1923, on the new issues provided the plan is consummated. No change is contemplated in the common stock of which \$2,995,000 is outstanding and no additional bonds are to be issued under the plan.

The American Public Utilities Company controls through stock ownership certain of the properties operated under the management of Kelsey, Brewer & Company. Among them is the Wisconsin-Minnesota Light & Power Company, which operates street railway systems in Eau Claire and Chippewa Falls and the interurban line connecting Eau Claire, Chippewa Falls and Altoona.

Charlottesville Still on Winning Side

For the year ended Dec. 31, 1922, the Charlottesville & Albemarle Railway, Charlottesville, Va., reports a net surplus of \$58,104, against \$42,098 in 1921, \$24,021 in 1920 and \$32,908 in 1919. These figures include the light and power departments as well as the railway department. The gross earnings from railway operation increased from \$50,957 in 1919 to \$76,336 in 1922. Railway operating expenses for 1922 amounted to \$47,683.

In his report to the stockholders John L. Livers, president, submits the fact that the year 1922 completed a period of ten years from the date of the purchase by the present owners of the property and tells what has been the progress made in that time. There has been an increase of 105 per cent in the number of passengers carried, the number in 1912 being 758,363 and in 1922 1,557,063.

Mr. Livers said he believed that the outlook for 1923 was especially encouraging and that the growth of the city would be felt in the receipts from the electric and railway departments.

Minneapolis Case Decided

Miscellaneous Expenditures Not Subject to Scrutiny When Not Included in Valuation Set Up

Permanent rate determination proceedings for the Minneapolis Street Railway will begin about March 1 before the Minnesota Railroad & Warehouse Commission. Following a decision on Feb. 2 by the Supreme Court of the State as to whether the railway and allied companies must produce certain records, the railway attorney announced he was ready to proceed. The city attorney said he wanted two weeks to go over the stock records and two weeks after that to get ready.

The Supreme Court decision is both for and against the company. The arguments had been heard by the court on an appeal from an order in mandamus action brought by the city to get certain records from the company. Judge F. M. Nye had ruled that the company must divulge the whereabouts of a fund of \$227,000 and the names and addresses of stockholders.

The Supreme Court decision held the \$227,000 had nothing to do with the valuation proceedings to determine a permanent rate of fare now under way. On the other hand, it affirmed the lower court's order regarding the information about stockholders. The court held as follows:

Where the railway balance sheets and income account showing its net earnings are made part of the application to the Railroad & Warehouse Commission all items entering into the account may be considered, and the nature of all expenditures which go to reduce the net earnings are subject to investigation. But when the company stipulated that certain expenditures are not to be considered as affecting the value of its property or as having any bearing on the rate of fare it may charge, an investigation of such expenditures is no longer material and may not be required. The court properly directed a corporation holding the stock of the street railway company and the officers and directors of the holding company to permit the city to inspect such books of the holding company.

Horace Lowry, president of the Twin City Rapid Transit Company, said of the Supreme Court decision:

In going over the decision it appears that the city is upheld in all of its claims to access to all the books of all the companies comprising the Twin City lines, and that the decision gives the city access to the stock books of the Twin City Rapid Transit

books of the Twin City Rapid Transit Company.

We do not now feel, nor have we ever felt, that the city should have access to the books of the Twin City Rapid Transit Company, as the company is only a stock-holder of the subsidiary companies and does not operate them, but we, of course, must and will abide by the decision.

The question of miscellaneous expenditures for which we have never claimed any credit in the valuation proceedings are, of course, ruled out as they could be of no real use to the city in the presentation of its case to establish the value of the properties or the proper rate to be charged.

Four per Cent Depreciation Charge Allowed

The Michigan Public Utilities Commission recently made an order granting the Muskegon Traction & Lighting Company permission to charge 4 per cent on its books for depreciation. The decision was made by the state commission after several months of investigation and it is said that this policy will be followed in the future. The ruling applies from 1920, when the troubles of the Muskegon company were placed before the Public Utilities Commission.

The decision gives the Muskegon Traction & Lighting Company a charge of \$34,261 for depreciation during 1922, and about the same amount in the two preceding years.

The report of the Muskegon company covering a period from August, 1920, to Jan. 1, 1923, shows a deficit of \$54,-301 after depreciation had been figured, while the cumulative earnings of the company during that period without figuring depreciation was \$3,450.

However, during 1922 the earnings of the company reached \$35,674, when depreciation was figured, while the year previous the company showed a deficit of \$25,787. This is interesting due to the fact that competing jitney lines were eliminated by a vote of the people in January, 1922.

The company now reports that business is increasing rapidly with the return of normal conditions and the elimination of the competing jitneys. However, the company in its annual report points out that an 8 per cent return on the property for the period would call for earnings of \$194,316, while there was a deficit of \$54.301, making the total deficit figuring on an 8 per cent return \$248,617. An 8 per cent return would have called for earnings of \$79,229 in 1922, while the earnings as shown by the books were \$35,674.

The Muskegon City Commission is maintaining its policy of preventing jitneys from competing with the rail-

Riding Increases in Ashtabula

The municipally owned street car line in Ashtabula, Ohio, continues to increase its business over a corresponding period last year. The system was owned by the Ashtabula Rapid Transit Company formerly.

In the first twenty-eight days of December, 1922, the receipts from car riders was \$8,175. The number of passengers carried was 103,784.

During the first twenty-eight days of January, 1923, the receipts were \$8,214. The number of passengers \$8,214. carried was 104,668.

The increase in the first twenty-eight days of December, 1922, over the same period the year previous was 27 per cent.

The percentage of increase of the first twenty-eight days in January, 1923, over the same period a year ago was 37 per cent.

Changes Proposed in Financial Structure

Chicago, North Shore & Milwaukee Railroad Handicapped by Closed Mortgage Plans for the Future

Changes in the financial plan of the Chicago, North Shore & Milwaukee Railroad so as to give greater elasticity of finance and permit capital expenditures such as will enable the company to accept the continuous new business offered it are proposed by the board of directors in a notice sent to holders of the participation shares. The plan recommended will be voted upon at the annual meeting of shareholders on Feb. 27.

The tentative plan for reorganization, in substance, provides for:

1. Creation of an open first and refunding 1. Creation of an open first and refunding mortgage under which bonds may be issued for retiring first mortgage bonds and other obligations issued for capital expenditures now outstanding and for capital expenditures in the future.

2. Issuance of \$10,000,000 prior iten 7 per cent stock, of which not less than \$1,500,000 would be immediately sold to

\$1,500,000 would be immediately sold to provide working capital and reimburse the treasury for capital expenditures made, the balance to be sold as required for capital expenditures and to retire equipment notes and secured notes in accordance with the sinking fund provisions governing these

3. Issuance of 50,000 shares of 6 per cent non-cumulative preferred stock, of \$100 per share par value, and 50,000 shares of com-mon stock, \$100 par value.

This \$10,000,000 of 6 per cent preferred and common stock is to be given to the participation shareholders in exchange for their 170,000 no-par participation shares in the ratio of 50 per cent thereof to the holders of first preferred participation shares, 40 per cent to holders of second preferred participation shares and 10 per cent to holders of common participation shares. This division is provided for in the participation trust agreement.

It is the intention to give recognition to the dividends in favor of the first and second preferred participation shares which have been set up on the books of the trustees and have not been paid. These dividends on Dec. 31, 1922, amounted to approximately \$2,700,000. In recognizing these dividends it is proposed to give the shareholders the unsecured non-interest bearing notes of the new corporation, payable five years after date, the new corporation at the maturity of the notes to have the option of either giving new notes bearing interest and payable in five years or of exchanging them for the company's 6 per cent non-cumulative preferred stock at par, or to pay the notes in cash.

In order to accomplish the reorganization it will be necessary for the trustees to sell the existing trust estate. The estate will then be acquired by a similar corporation organized under the railroad laws of Illinois and probably with almost the same name. If authorized by the participation shareholders, the trustees can be ordered to sell the properties at a price and upon terms determined by the shareholders in voting for the sale. A valuation of the properties is now being made so that the sale of the trust estate can be made with absolute knowledge of the values involved and the new co.poration capitalized in the same way with these values in view.

In the notice to participation shareholders Samuel Insull, chairman of the board of directors, points out that the business of the company has shown rapid and continuous growth, but that because of the restrictions in the trust agreement it has been impossible to provide the capital necessary for added improvement and facilities. He said:

Continually increasing revenues will be the determining factor in the life and success of the properties and to obtain such revenues large capital expenditures will be required. We should not, in my opinion, hesitate to make these expenditures for our experience in the last six years shows that \$1 of new revenue has been produced by approximately \$1.53 of capital expenditures. tures.

These properties have proved themselves to have great possibilities, but in the future they must be given the aid of capital through sound and flexible financing plans.

HANDICAPPED BY CLOSED MORTGAGE

Mr. Insull points out that the company at present is handicapped with a closed mortgage limiting it to the issuance of \$10,000,000 par value of bonds. Of these \$4,060,000 were issued in acquiring the properties through reorganization. The company has since issued \$2,845,600 of these bonds for capital expenditures, but because of inability to market them at a satisfactory price, these were pledged as collateral to secure notes. The company cannot issue junior securities, such as preferred stock, because of the restrictions of the participation trust agreement, and therefore the only other permanent financial resource lies in its bond issue. 70 per cent of which has been exhausted either through sale or pledge.

During the period of ownership ended Sept. 30, 1922, it is pointed out, the company issued \$5,190,000, par value, of secured notes, including notes given for equipment. Of these approximately \$2,925,000, par value, were outstanding. On the same date additions and betterments to property over the period totaled \$5,659,255. Of this amount \$1.882,098 was obtained through sale of securities, \$572,500 from real estate and bank loans and the balance of approximately \$3,200,000 came from operating revenues and operating reserves. Less than 40 per cent of the capital expenditures of the company have been funded. and of this amount approximately \$147,000 must be retired annually.

The provisions of the trust agreement under which the participation shares were issued in exchange for the old first mortgage bonds require the trustees to set up on their books as a dividend account for the benefit of the participation shares 30 per cent, less certain deductions for interest, of the gross revenues of the two properties included in the reorganization the Chicago, North Shore & Milwaukee Railroad and the Chicago & Milwaukee Electric Railway, owning the Milwaukee city line or the net revenue, whichever may be the greater. These dividends have been retained and used for capital expenditures, shareholders being paid interest upon them.

A statement of the meaning of the plan to the shareholders follows:

1. It will give the Chicago & North Shore a clean financial set-up retiring all equip-ment notes, collateral notes and floating debt and doing away with present sinking

It will make the bonds and stock issues

funds.

2. It will make the bonds and stock issues the only outstanding obligations of any kind aside from current liabilities.

3. It will place the company in a position readily to obtain working capital to care for the rapid growth of its business.

4. The shareholders will receive in exchange for present participation certificates (on which they do not now receive dividends) preferred stock paying 6 per cent dividends, which rate can be safety earned and which shareholders should immediately receive.

and which shareholders should immediately receive.

5. Shareholders will receive the cumulative dividend which it has been impossible to pay them, in the form of non-interest bearing notes, payable in five years. The company will have the privilege of either giving new notes bearing interest or exchanging the company? a 6 per cent non-cumulative preferred stock at par for the notes or paying them off in cash, as it may elect, at maturity. The cumulative dividend on the first preferred participation shares now amounts to \$25 and there is approximately \$24 owing on the second preferred participation shares.

Operating revenue of the company has shown a continuous increase, as follows: 1916, \$1,157,191; 1917, \$1,751,-373; 1918, \$2,899,975; 1919, \$3,237,921; 1920, \$4,193,869; 1921, \$4,500,805.

The report for the year 1922 is expected to show a healthy increase both in operating revenue and net income over the preceding year.

Plan Approved for Funding Accumulated Dividends

Stockholders of the American Railways, Philadelphia, at a special meeting in Camden on Feb. 1, approved plans for funding the accumulated dividends on the preferred stock, authorized an increase in the issue from \$4,000,000 to \$8,000 000, sanctioned the abolition of the \$4,000,000 second preferred stock, none of which has been issued, and the transfer of stocks of certain subsidiary companies to the Consolidated Light, Heat & Power Company, owned by the American Railways.

It was also voted to change the name of the American Railways to American Electric Power Company. There were voted 28,940 shares of the 40,000 outstanding shares of preferred stock and 138,170 shares of the 189.200 outstanding shares of common stock.

Van Horn Ely, president, said there was a wonderful future for the company. He estimated this year's net income would be 50 per cent greater than that of 1922, when 7 per cent was earned on the preferred and 9.3 per cent left for the common.

The value of the properties embraced in the system was \$80,000,000, he declared, and these are capitalized for \$70,000,000. He considers the financing plan a constructive move. The amount of the new financing, Mr. Ely continued, would run from \$11,000,000 to \$12,000,-000, and would net the company \$900 on the \$1,000. Reports of the bankers' engineers, he said, showed 90 per cent of the properties in 100 per cent physical condition.

A general outline of the terms of the plan was published in the ELECTRIC RAILWAY JOURNAL for Jan. 20, page 142.

Duluth-Superior Increases Net

Though the gross revenue of the Duluth-Superior Traction Company for the twelve months ended Dec. 31, 1922, of \$1,786,020 fell off \$18,820, the net revenue of \$380,654 increased \$63,516 over the previous fiscal year, according to figures now obtainable from the annual report of the company, which has just been made public.

Decrease in operating expenses through a cut of \$87,939 under that item of expenditure is largely responsible for this showing. The decrease in the operating expense is attributed to the most rigid economy in the operating of cars in Duluth under a standard of service fixed by the City Council.

The number of revenue passengers carried during the year reached a total of 32,036,900, as compared to 34,596,264 for 1921, and 5,366,900 transfers were redeemed, as against 5,809,271 for the preceding year. An unusual amount of

Income	1922	1921
Railway operating revenu		\$1,761,503
Revenue from other opera		41,701,303
tions	13,740	15,826
Totals	\$1,759,046	\$1,777,330
Operating expenses		
Way and structurea	\$212,749	\$205.324
Equipment	180,229	197,891
Power	160,455	152,374
Conducting transportation	659,549	740,415
Traffic	322	229
General and miscellaneous	213,386	918,319
Transportation for invest- ment—eredit	21,328	1,251
Net railway operation	\$353,681	\$284,025
Taxes assignable to railway operation	113,273	107,410
Operating income	\$240,407	\$176,615

track construction and reconstruction was undertaken and completed during the year. In addition to \$113,333 expended for renewals and charged against depreciation reserve, there was expended during the year \$173,464 for additions to the property.

Five dividends at the rate of \$1 per share up to the quarter ended June 30, 1922, were paid upon the 4 per cent cumulative preferred stock, but no dividends were declared upon the common capital stock. Operating expenses were 85.03 per cent of the gross income, as compared to 88.69 per cent in the preceding year. Upon the preferred 6.14 per cent was earned and \$5 paid and upon the common stock 0.92 per cent was earned.

on Dec. 31, 1922, was valued on the books at \$10,019,099, as compared with a valuation of \$9,836,635 at the end of the preceding year.

In the review of the year's work by A. M. Robertson, Minneapolis, president of the company, he calls attention to the increased fare contest and its present standing. An appeal has been taken by the city of Duluth to the United States Supreme Court, where the case is now pending.

President Robertson also referred to the action of the Duluth Chamber of Commerce in appointing a special committee with instructions to take up negotiations with the city of Duluth and with the railway company with the object of settling by compromise all litigation now pending between the company and the city and the reaching of an agreement upon certain extensions of lines to be made during the coming year. The hope was expressed that the agreement would result in a mutually satisfactory adjustment of all the present controversies with the city of Duluth.

The comparative statements of the system's revenue account for 1922 and 1921 are shown in the accompanying table.

More than Agreed Rate of Return Earned in New Orleans

The income statement of the New Orleans Public Service, Inc., for October, November and December has been made public. The figures are separated by departments. The statement covers the first three months of the test year to which present rates are to be subjected under the agreement reached by the security holders of the corporation and the city, before a change in car fare charge or the rate for gas or electricity may be made. The statement discloses that the corporation has earned 7.80 per cent, or a little more than the basic rate of return of 7.50 per cent agreed upon by the conferees.

The report is a very flattering one, in the opinion of Commissioner Paul Maloney of the Department of Public Utilities, to whom it was submitted, and according to him gives rise to the hope of a reduction in rates, if the earnings during the remainder of the year are as satisfactory as the figures for the first three months.

On the other hand, Vice-President O'Keefe, in the absence of President Hecht, in commenting upon the report, was of the belief that the return of 7.80 per cent during the peak period presaged a return of not more than 6.80 per cent in the dull months of summer.

The report of the railway department and of the railway, electric and gas departments combined is contained in the accompanying table.

Railway Wins Tax Suit

The Public Service Railway will save \$150,000 in taxes and the Public Service Electric Company and the Public Service Gas Company will profit to the extent of \$100,000 and \$50,000 respectively in assessments as the result of decisions made public recently by the State Board of Taxes and Assessment.

In the case of the railway company the city of Newark took appeal to the State board from the decision of the Essex County Board of Taxation in canceling the assessment levied for the year 1922.

The Newark officials taxed the "sub-way" of the company in the amount of \$150,000, but this assessment was canceled under a law passed in 1919.

This statute imposes an additional franchise tax upon the gross receipts of street railway, traction, gas and electric corporations using or occupying public streets, etc., in lieu of taxation of certain property of such corporations, and is termed "personal property." However, the city contended this law did not include subways.

Price Fixed at \$18,000

The purchase price of the Bay Shore Railway property, 1.5 mile of track extending from Green Bay to a municipal amusement park, was fixed by the Railroad Commission of Wisconsin at \$18,000. The line was sold last summer by the Bay Shore Railway to the Park Railway Company, a subsidiary of the Wisconsin Public Service Corporation, under contract calling for the price to be fixed by the commission.

The line has never paid expenses and the Wisconsin Public Service Company, reluctant to burden other city lines with this one, formed the new company to take it over. It is in operation only during the summer months.

The transfer was in question for several months and the companies were as far apart on the matter as the difference between \$29,000 and \$9,000, the original investment and the scrap value respectively.

NEW ORLEANS PUBL	IC SERVICE	E. INC.		Three
Railway department:	October	November	December	Months' Total
Operating revenue	\$654,361	\$613,305	\$658,645	\$1,926,312
placement reserves.	468,301	442,703	458,867	1,369,872
Net operating revenue	\$186,060 62,000	\$170,601 62,000	\$199,778 62,808	\$556,439 186,808
Net operating income	\$124,060 2,674	\$108,601 8,920	\$136,969 9,739	\$369,631 21,334
Gross corporate income	\$126,734	\$117,521	\$146,709	\$390,965
All departments: Operating revenue Operating expenses, including renewals and replace-	\$1,173,195	\$1,166,679	\$1,251,994	\$3,591,870
ment reserve	773,483	757,658	792,154	2,323,297
Net operating revenue	\$399,712 112,715	\$409,021 113,875	\$459,839 112,959	\$1,268,373 339,549
Net operating income	\$286,997 4,338	\$295,146 13,683	\$346,880 15,483	\$929,024 33,505
Gross corporate income Income deductions	\$291,336 146,010	\$308,829 191,239	\$362,364 182,943	\$962,529 520,193
Balance available for sinking fund requirements, dividends and surplus reserve	\$145,325	\$117,589	\$179,420	\$442,336

Prosperous Year in Cleveland

Year's Earnings Make Possible a Five-Cent Fare With Eleven Tickets for Fifty Cents

Stockholders in the Cleveland (Ohio) Railway, at their annual meeting Jan. 31, were informed by the president, John J. Stanley, that their company enjoyed a most prosperous year in 1922. Mr. Stanley pointed out to the stockholders that another result of this prosperity would be evidenced on March 1, when the rate of fare would be reduced to 5 cents cash, eleven tickets for 50 cents with a 1-cent charge for transfer.

The company ended the year 1922 with an actual surplus of \$1,134,657, although the gross income of the company for the year, amounting to \$17,082,-393, was a decrease of 4.02 per cent over the year previous. The prosperity of the company in 1922 is best summarized and explained, in spite of the reduction in gross income, by the fact that expenses per car-mile in 1922 were 34.24 cents, as against 38.04 cents per carmile in 1921, and 38.85 cents per carmile in 1920.

The interest fund, which is the fare barometer, contained \$502,429 at the beginning of this year, as compared with a deficit of \$89,034 at the end of When this fund drops below 1921. \$300,000 the fare goes up and when it goes above \$700,000 the fare must automatically be reduced. The company's fiscal year ends on March 1, at which time there will be transfers from surpluses in other funds to the interest fund, which will bring this sum over the \$700,000 mark. In addition to the surplus and interest fund, the company also ended 1922 with a surplus of \$790,-780 in its maintenance reserve fund and \$500,677 in its operating reserve fund.

President Stanley reported that the stockholders now number 5,936, which 5,327 are Ohioans and 3,957 live in Cuyahoga County.

During 1922, the riders numbered 402,262,233 as compared with 399,429,-666 in 1921. Taxes in 1922 amounted to \$1,378,933 as compared with \$1,181,-144 in the year previous and now amount to 8.07 per cent of the company's gross income.

The result of the company's efforts to reduce the sums paid out for injuries and damages, by intensive safety first campaigns among employees and car riders, is reflected in the fact that the amount paid to claimants for damages and injuries in 1922 was \$951,056 as against \$1,216,949 in 1921.

Stockholders also were informed that probably some time during 1923 the company would purchase all of its power instead of generating 20 per cent of it. as it is doing at the present time, with the Cleveland Electric Illuminating Company taking care of the bulk of its requirements. Mr. Stanley reported it was costing the company more to produce its own power than the amount for which it could be purchased.

In 1922 the company operated 37,215,-800 car-miles, while in the year previous the number of car-miles was 37,118,227. system."

Mr. Stanley concluded his report in the following words:

Mr. Stanley concluded his report in the following words:

We should plan for the year wherein 500,000,000 riders will seek our service. Our partner in this undertaking, the city, should not another year ignore its duly to enable us to obtain the funds to provide for the city's transportation needs. It realizes, as we do, that the city's growth in population and area and the hoped-for increases in our business demand service adequate to the increases and proper for the development of that area. It knows that that means additional rolling stock, tracks, buildings and power. The contract between us and the city was made for the purpose of securing "to the city of Cleveland adequate and efficient service," and, notwithstanding repeated failure of the city in the past, I believe It will realize its duty to put us in a position to give It that which we contracted to give.

I repeat for the third time the policy to which your directors will of necessity adhere until the city acts.

Because of lack of funds that we may use on capital accounts, it is necessary, in our own interest, to cease altogether the spending of money for additional property, even such as ought really to be regarded as essential to the prosecution of our business. We shall continue to maintain your property well and to operate it as efficiently as we may. The security of your investment and the certainty of the 6 per cent return thereon were never better than now. We shall not take any action that may jeopardize either, and, whereas our policy should be one of expansion it will be one of conservation.

Tidewater Bondholders Urged to Sell

The Birmingham-Tidewater Railway will probably again be operated entirely independent of the Birmingham Railway, Light & Power Company. protective committee of the \$15,000,000 of first mortgage 5's is in receipt of an offer of purchase of the bonds and has recommended its acceptance. The prospective purchasers have indicated that they will pay 68 per cent of the face amount of the bonds flat, claims for interest accrued but not paid to go to the purchasers. It is stipulated, however, that holders of 75 per cent of the deposited bonds must signify their willingness to sell for the deal to be put through.

The Birmingham-Tidewater Railway is the successor after reorganization of the Birmingham, Ensley & Bessemer Railroad. The first mortgage bonds of the company were issued in 1917 and are guaranteed principal and interest by the Birmingham Railway, Light & Power Company. The consideration for this guarantee was the transfer to the Birmingham Railway, Light & Power Company of all of the \$325,000 capital stock of the Birmingham-Tidewater Railway.

In 1919 the railway and power company went into receivership. As the railway and power company is to be reorganized and as the guaranty of that company to the Tidewater Railway is a simple contract that may possibly be set aside in the reorganization, leaving the Tidewater holders with nothing ahead of them except the prospects of foreclosure, the committee is urging the bondholders to sell. In this connection it is cited that the Tidewater lines were operated at a loss every year since 1918. The committee says that it "feels it is not more practicable now than it was in 1916 successfully to operate these properties as an independent traction

New York City Transit Lines **Show Profit**

The November reports of the transit companies of New York City, recently tabulated by the Transit Commission, show an aggregate profit of \$61,696, against \$6,000 in October. This is the second time since the war that the combined results have shown a profit. So marked an improvement brought an expression from the commission's statistician that all the lines would likely show a small net profit for the fiscal year ending June 30, 1923.

During the fiscal year ended June 30, 1921, the deficits of the companies nggregated \$16,914,256 and for the fiscal year ended June 30, 1922, they aggregated \$3,043,760. For the first five months of the fiscal year 1922 an aggregate net loss to the companies was recorded of \$522,982, a gain of \$1,436,-533 over the same period of 1921.

Auction Sales in New York .- At the public auction rooms in New York there were no sales of electric railway securities this week.

New Directors Chosen.-At an annual meeting of the stockholders of the Traction Company, Duluth-Superior Duluth, Minn., H. F. Salyards was elected to the board of directors and C. R. Fridley was elected to succeed W. H. Goadby.

Bonds Bought by Syndicate. - The Eastern Wisconsin Electric Company, Sheboygan, Wis., has sold \$1,917,000 of twenty-year 6 per cent bonds to a syndicate including Hill, Joiner & Company, Paine, Webber & Company and Halsey, Stuart & Company. The property is controlled by the Middle West Utilities Company.

Tax to Be Paid .- According to orders issued by Judge W. I. Grubb, United States Judge of the Northern District of Alabama, to the co-receivers, Lee C. Bradley and J. S. Pevear, the Birmingham Railway, Light & Power Company's tax for the years 1920, 1921 and 1922 will be paid. This is the state franchise tax and amounts to \$4,400 annually without interest.

I. R. T. Files \$6,935,467 Claim Against Queens Line.—Judgment for \$6,935,467 has been filed by the Interborough Rapid Transit Company, New York, against the New York & Queens County Railway. The complaint in the action was verified by H. M. Fisher, secretary of the Interborough company, and confession of judgment was acknowledged on Jan. 30 by A. Leon Pepperman, trensurer of the New York & Queens County Railway. Counsel of the Interborough said the road seeks to conserve its claims against the Queens company and that this judgment will be considered by the receiver along with other This judgment, it was said, claims. would be paid only in the same manner that any other claim against the New York & Queens County Railway would be paid. Col. Grayson M.-P. Murphy, chairman executive committee of the Interborough board, recently said the Interborough would no longer pay recurring deficits of the Queens County company.

Traffic and Transportation

Interurban Rates Reduced

Slight Reduction at Racine Involves the Introduction of the Weekly Ticket or Pass

A slight reduction in rates and a readjustment in service were announced for Feb. 5 on the interurban electric line of the Milwaukee Electric Railway & Light Company between Racine and Kenosha, Wis.

The company has been operating one train an hour connecting Milwaukee, Racine and Kenosha and a second train between Racine and Kenosha, giving Racine and Kenosha-half-hourly interurban service. Recently the company acquired the operating equipment of two bus lines which were competing with the interurban between Racine and Kenosha. A plan has been worked out whereby the bus service will be continued by the Wisconsin Motor Bus Lines, its subsidiary, it being co-ordinated with the interurban service in such a way that Racine and Kenosha will have one electric interurban train and two buses an hour, giving these cities practically twenty-minute service.

The one-way ticket fare between Racine and Kenosha will be reduced to 30 cents, with a transfer to city rail cars on the inbound trip and a city fare allowance of 7 cents on the presentation of a city rail transfer when the ticket will be purchased.

The company will also introduce on this line a weekly ticket or pass. This pass will cost \$1.75 and will be good for unlimited riding on the interurban cars between the two cities from the south fare limits of Racine to any point on the interurban line in Kenosha and from the north fare limits of Kenosha to any point on the interurban line in Racine. However, on boarding the interurban either in Racine or Kenosha the passenger will either have to pay a city fare, present a city rail car transfer or exhibit a city weekly pass which is in use both in Kenosha and in Racine. Any one of these three forms of transportation will entitle the holder to a ride to the city limits, from which point his weekly pass can be used for the re-

This arrangement has been made in view of the fact that a large number of people in Kenosha travel only to the north limits of Racine, where certain manufacturing concerns are located. It has been computed that for a person making one round trip each day between Racine and Kenosha, the fare by using the weekly ticket and including the city fare in either city on the outbound trip will be approximately 19 cents one way as against a ticket fare of 30 cents.

mainder of the journey.

Other forms of commutation such as the ten, twenty and fifty-two-ride tickets and the 500 and 1,000-mile mileage books will remain in effect.

Both the Milwaukee Electric Railway & Light Company and the Wisconsin Motor Bus Lines have announced in the public press that they are anxious to give Racine and Kenosha the best possible service, and that through co-ordination of rail and motor bus facilities they will be able to eliminate wasteful operation, permitting both lines to give the maximum service at reasonable rates with the greatest degree of comfort and when it is most needed.

Milwaukee Northern Changes Terminal

The Milwaukee Northern Railway announced that on Feb. 1 it would make its terminal at the Public Service Building in Milwaukee. The Public Service Building is the terminal of the Milwaukee Electric Railway & Light Company. The Milwaukee Northern was recently acquired by the North American Company, which also controls the Milwaukee Electric Railway & Light Company. It operates an interurban electric railway between Milwaukee and Sheboygan, a distance of about 50 miles.

At the same time the running time between Sheboygan and Milwaukee will be slightly reduced. The present terminal of the Milwaukee Northern is on Fifth Street between Wells and Cedar, about five blocks distant from its new terminal. In reaching its new terminal the Milwaukee Northern trains will pass the Chicago, North Shore & Milwaukee terminal and the Chicago, Milwaukee & St. Paul terminal and will be within two blocks of the Goodrich Transit Company's docks, thus permitting very close connections with these various lines for Chicago.

Kalamazoo Votes Down Bus Project

An attempt to establish a municipal bus system to supplant the Michigan United Railway street ear service in Kalamazoo was buried under a storm of votes at a special election Jan. 30. Only 40 per cent of the total vote of 7,411 was favorable. Sixty per cent was necessary to carry. The street railway franchise expires Feb. 13.

The election came at the request of a few city officials who wanted Kalamazoo to experiment with bus transportation. A proposed franchise was rejected in order that the people might first pass on this question. A day-to-day agreement is now pending, which includes buses operated by the street railway on two proposed routes as auxiliary to established lines.

Statewide interest was aroused by the campaign. One reason ascribed for the defeat of the bus plan was that most of its warmest advocates were identified with interests that had automotive equipment to sell to the city.

Los Angeles Mayor Expresses Himself on Buses

Mayor Cryer of Los Angeles in discussing the pending franchises sought by new bus corporation to compete with the local railways declares that the railway in Los Angeles will soon be a back number. He has taken no definite stand in connection with the application of the new bus corporation for motor bus franchises in Los Angeles, and he declares that he enters into consideration of the matter with an open mind. However, his views are interpreted as being favorably inclined toward motor bus transportation. The Mayor said:

In the matter of transportation accommodations, public interest is paramount to private gain. It may be the public interest, however, to permit present conditions of transportation to continue, augmented with additional and new facilities. That is the question that must be determined in our studies of the application for bus line franchises.

Under regular procedure a request for a franchise of any kind must be finally settled in the City Council. However, it is possible that the applicants may amend their application to operate bus lines and ask for permits which may be canceled by the city under certain stipulated provisions. In this event. the utilities board would be empowered to issue the permit without the sanction on the part of the City Council. The Council, if it is so inclined, however, may throw impediments in the way of such action through orders to any municipal department, which must then abide by the instructions of the Council.

Club Formed to Reduce Traffic Accidents

Co-operating with the Dayton (Ohio) Street Railway, the Dayton Journal has organized "The Journal Life Savers' Club" in an effort to reduce the number of traffic accidents in the Gem city. Thirty employees of the street railway company were announced as charter members of the club, to be presented with certificates and neat bronze buttons to be worn on the coat. These men passed through the entire year 1922 without a traffic accident.

The club is not to be confined to employees of the traction line, however, as from now on all operators of public conveyances, such as taxicabs, motorbuses, interurban cars, etc., as well as freight truck drivers, will be eligible for membership providing they went through 1922 without an accident. The same rule will apply at the end of 1923 for drivers who go through this year without an accident, and where a club member for 1922 also succeeds in "making the club" for 1923 his certificate will bear an additional indorsement, while a small bar will be suspended from his button to show two consecutive years without a traffic

The plan has won the commendation of local city authorities, business men and others who are interested in reducing the number of traffic accidents in Dayton, and it is being studied for application in other of the larger cities.

Changes Proposed in New Orleans

John A. Beeler, New York, who is now making a study of the Public Service, Inc. (the New Orleans Railway & Light Company), conferred recently with Commissioner Maloney of the Publie Utilities Department of New Orleans. President Abels of the National Light & Power Company and R. S. Hecht, president, and A. B. Paterson, superintendent of the local company, with a view to reviewing certain recommendations of the Beeler organization. Included among the suggestions by Mr. Beeler are plans for the elimination of certain lines, the establishment of others and the rerouting of still others.

Nothing definite was done as the Beeler report will probably not be finished for some time. One of the proposed changes involves the widening of North Rampart Street from Esplanade to Elysian Fields Avenue. The carrying out of this suggestion would make it necessary for the railway to acquire a considerable amount of ground between the two streets. This would cost about \$300,000. As the city is without money to buy, the expense of the improvement if the work is carried out would have to be borne by the railway. In this event, the cost would be carried to the capital account of the railway and increase the base amount on which the company is permitted to earn a return. In referring to the matter. Commissioner Maloney said that it was too early to speak definitely on the subject, but he was of the opinion that a way would be found to remedy the obstacles that appear to prevent the laying of double tracks on North Rampart Street.

Protest Interurban Fares

The City Attorney of Pasadena, Calif., filed a brief with the California State Supreme Court on Jan. 30 demanding that the situation be corrected with reference to the through interurban passenger rates as charged by the Pacific Electric lines between Los Angeles and Pasadena, pointing out that the through interurban fare is greater than the intermediate fare. The city attorneys of South Pasadena, Alhambra and Glendale also joined in the petition to the court.

The brief attacks the ruling of the California State Railroad Commission, establishing the fares now in effect, as a violation of the State constitution. As an example of the asserted discrimination, the brief points out that the fare on the Pacific Electric lines from Pasadena to Sierra Vista and from Sierra Vista to Los Angeles is 20 cents. The through fare from Los Angeles to Pasadena, however, is 29 cents, the brief affirms. It is also cited that the fare from Los Angeles to South Pasadena is 24 cents, while the short-haul fare is but 16 cents.

Petition on Fare Reduction Denied.— The Public Utilities Commission of Maine recently denied the petition of Charles Dick and others for a reduction in fare from 9 cents to 7 on the

Androscoggin & Kennebec Railway. The petition was also denied for a reduction of the number of fare limits between Lewiston and Lisbon Falls.

Buses on Bridge Started.—The Springfield (Mass.) Street Railway's bus service across the Hampden County Memorial Bridge was started on Jan. 29. Trips are made every fifteen minutes, and transfers are given free to buses from the trolley cars and to the trolley cars from the buses.

Enters Bus Business.—The Waterloo, Cedar Falls & Northern Railway is planning to operate buses in connection with its regular railway service. As a step in this direction it has taken over the Johnson bus line, doing business between Waterloo and Cedar Falls, Iowa. The plan of the company is said to include provisions for issuing transfers from the buses to the cars in its electric interurban service between Waterloo and Cedar Falls.

New Signs Being Used.—The Memphis (Tenn.) Street Railway is installing new signs, marking cars with their routes. In addition to the names heretofore employed, numbers which more quickly identify routes are also being used in the new signs. The new markers are being located in plainer view just above the motorman's window. A duplicate of the front-end marker is also being installed on the side of each car. In several cases names of lines have been changed and shortened, allowing the use of larger letters. This makes the sign more legible.

Will Supplement Railway with Buses. -The Wilkes-Barre (Pa.) Railway is planning to operate motor buses over North Street bridge supplemental to the regular trolley service. This will be a convenience for thousands of west side residents, who heretofore had to suffer real hardships to get to town. A charter is being sought in the name of the Wyoming Valley Autobus Company and a hearing will be held on Feb. 13. The traction company had completed arrangements for opening the bridge as a trolley route, but pending necessary strengthening of the structure buses will serve the purpose.

Proposals Turned Down .- Proposals of the Indianapolis Board of Public Safety that street cars be stopped on signal of prospective passengers from the curb, thus minimizing the danger of persons being struck by automobiles while waiting in the street, have been turned down by the Indianapolis Street Railway. The principal objection on the part of the company is that such plan would place the entire burden of safety of passengers waiting to board cars upon the company and thereby relieve automobile drivers of responsihility. Other objections pointed out by Robert I. Tadd, head of the company, state that it would be impossible for motormen to see passengers on the eurb in rainy weather or at night, that the plan would cause innumerable arguments and complaints and that it would slow down the running time of the cars.

Book Reviews

Report of First Annual Conference of Tennessee Public Service Association

This is a full report of the meeting in Knoxville on Dec. 14, 1922, reported on page 1,018 of the issue of this paper for Dec. 30, 1922.

Preparation of Light Aluminum-Copper Casting Alloys

By R. J. Anderson, Technical Paper 287. United States Bureau of Mines, Washington, D. C.

A forty-four-page pamphlet giving an analysis of present methods used, with suggestions, by the author, as to the best procedure.

The Reorganization of Railways in Great Britain, Its Progress and Prospects

By H. B. Attin Smith, American assistant trade commissioner, London. Supplement to Commerce Report, published Jan. 10. 1923, by the Bureau of Foreign and Domestie Commerce. Twenty-eight pages.

The steam railroads of Great Britain have been going through a crisis somewhat similar to those in this country, and details are given of the pre-war rate-making system, the conditions which arose during the war with the increased rates put into effect, the subsequent lowering of rates and wages, and present conditions. Under the new railways act, by July 1, 1923, the existing 120 or more companies in Great Britain are to be arranged into four geographical groups. Details of the act, opinions on it, statistics of the railways and other facts are given.

Decisions of Courts and Opinions Affecting Labor in 1921

Buffetin 309, United States Department of Labor, Bureau of Labor Statistics, Washlogton, D. C.

Approximately 250 cases, illustrating many phases of the questions involved in the relations of employers and employees, are presented in this bulletin. One-half of these cases relate to questions arising in the administration of the workmen's compensation laws, while thirty-seven are selected cases relating to labor organizations, their status, activities, etc. Other subjects receiving attention are minimum wage laws under which four cases are considered. and the federal statute relating to railroad service, under which there are twelve. Although a great majority of the states have workmen's compensation laws, there is still frequent recourse to the common law or statutes relative to employers' liability, a score of such cases appearing in the report. besides a group in which the rights of seamen are considered. None of the cases is reproduced fully, but a summary statement introduces in most cases quotations from the language of the courts, setting forth concisely the principal points involved, in such a way as to facilitate an understanding of the subject matter.

Legal Notes

California—Negligence of Mother Imputable to Father Claiming Damages for Death of Child.

In father's action for death of infant child, in which the mother was not joined as a plaintiff the contributory negligence of the mother was a good defense, on the theory that in caring for the child she acts for her husband and her negligence in caring for the child is the negligence of the husband. [Kenna vs. United Railroads of San Francisco, 207 Pacific Rep. 35.]

Illinois — Profit from Other Business Need Not Be Considered in Determining Duty to Operate—A Reasonable Rate Does Not Mean a Nonconfiscatory Rate.

Where a corporation was engaged in operating a street railway and also in furnishing light and power to the city, the fact that it was making a profit on its light and power does not authorize a requirement that it operate its street railway at a loss, but where the entire street railway system is earning a reasonable return, the company cannot even abandon the service on certain of its lines, because they do not yield a profit.

A public utility is entitled to a rate which will yield a fair return on the value of the property used by it for public convenience, and not a rate which is merely nonconfiscatory, and the public is entitled to demand that the rate be no more than will yield a fair return. [Northern Illinois Light & Traction Co. vs. Illinois Commerce Commission ex rel. City of Ottawa, 134 Northeast. Rep. 142.]

Indiana—School Wagon Driver's Negligence Not Imputable to Parent of Pupil Injured in Collision.

The negligence of the driver of a wagon furnished by the township trustees to transport children to school and resulting in the death of a child, could not be imputed to the parent, who, while having the right to avail himself of the agency, had no right to control or regulate it. [Union Traction Co. of Indiana vs. Gaunt, 135 Northeast. Rep. 486.]

MASSACHUSETTS — Negligence Cannot Be Assumed Because of Height of Running Board.

In a passenger's action for injuries sustained by a fall in alighting, the testimony of an expert that the running board could have been lowered, with nothing to indicate how much lower it could have been made, and testimony that in Boston the running boards were only 17 in. above the track, 3 in. lower than defendant's running board, did not warrant a finding of negligence, defendant's railroad being in a country district. [Kinnarney vs. Milford & U. St. Ry. Co., 134 Northeast. Rep. 614.]

Massachusetts — Automobile Passenger Negligent in Trusting Entirely to Driver.

A woman riding with her husband in an automobile driven by him which skidded and turned over on street car tracks in front of an approaching car could not recover if she negligently abandoned the exercise of her own faculties and trusted entirely to his care and caution, and his negligence caused or contributed to the accident. [Lambert vs. Eastern Massachusetts St. Ry. Co. (two cases), 134 Northeast. Rep. 340.]

Michigan — City Has Power to Pass Ordinance Requiring Single Truck Cars to Travel More Slowly.

An ordinance of a city limiting the speed of single truck street cars to 12 m.p.h. while permitting double truck cars to run 15 m.p.h., is one passed in the exercise of the police power, and it cannot be said that the city exceeded its power to classify the cars by permitting those equipped with double trucks to run faster. [Beaubien vs. Detroit United Ry., 185 Northwest. Rep. 885.]

New York—Public Service Commission Law Applies Only to Transportation of Persons and Property—Extent of Debts No Reason for Not Compelling Street Railway to Conform Tracks with Grade.

Public Service Commissions Law. Sec. 50, providing for regulation of repairs, improvements, changes, etc., of public carriers, applied to these matters only as they affect the transportation of persons and property.

Where it was the duty of a street railway under its contract with a city to conform its tracks with an altered grade of the street, mandamus would lie to compel the conformance, although the street railway had liabilities of about \$900,000 and cash on hand of only \$450,000, and the city had other paving work in prospect upon streets which, if prosecuted all at once, would be beyond the financial ability of the company, where there were sufficient funds to carry out the project in question. [City of Syracuse vs. New York State Railways, 189 New York Suppl. 763.1

New York — Municipal Corporations Have Only Power Given by Legislature—Board of Estimate of New York City Has No Discretion but to Make Appropriations Requested by Transit Commission.

It was the duty of the board of estimate and apportionment of New York City, upon receiving requisitions from the Transit Commission under the Public Service Commission Law, for an appropriation to pay expenses.

to make the appropriation in the sum demanded, as in making such appropriation the board acts in a ministerial way.

A municipal corporation has no power except such as is given to it by the Legislature, and any power thus given may thereafter be modified, diminished, or recalled. [McAneny et al., Transit Commission vs. the Board of Estimate and Apportionment of the City of New York, 134 Northeast. Rep. 187.]

NEW YORK—A Passenger Must Subject Himself to Reasonable Rules, and Has No Right of Action, Where Ejected from Street Car Because of a Late Transfer.

Passenger on a street railway must subject himself to reasonable rules of the carrier and if a conductor insists that his transfer has expired, he should pay another fare and take the matter up with the company later. In this case the transfer was lost. The conductor declared it was late. The passenger did not notice the time punched but declared he took the first following car from the transfer point. [Coffrey vs. United Traction Co., 192 New York Sup. 96.]

Pennsylvania — Injury to City Employee Entering Work Car Held Not Actionable.

Where a city employee inspecting track repair work, whose employment did not require him to ride on the street railway company's work car. entered the car to eat his lunch at the invitation of the company's foreman. he was at the most a mere licensee, and not entitled to recover against the company for injury by the lurching of the car when the motorman lost control while shifting it on a grade, unless the injury was the result of intentional, wanton, or willful acts. [Bally vs. Pittsburgh Railways, 116 Atlantic Rep. 161.]

Montana—Company Held Not Entitled to Discontinue Part of a Unit of Its Lines. Fare Provisions and Paving Requirements Subject to Regulatory Power of State.

A proviso, in a street railway franchise that the company shall not be required to operate its lines or any "part or portion thereof at a loss," only grants permission to discontinue the entire system, or any entire unit, not any part of a line. Nevertheless, the city's right to enforce that requirement by injunction is subject to the power of the state, through the Public Service Commission to relieve the company therefrom. Provisions in a city ordinance requiring a street railroad company to pave the streets between its tracks and to sell commutation tickets. and that cars make a minimum number of trips daily between designated hours. do not relate to property rights which are beyond legislative control. [City of Helena vs. Helena Light & Ry. Co., 207 Pacific. Rep. 337.1

Personal Items

Britton I. Budd Heads Northern Illinois Company

The Public Service Company of Northern Illinois on Feb. 6 announced the executive reorganization of the company to meet exigencies created by the death of Frank J. Baker, vice-president of the company. Samuel Insuil resigned from the presidency to become chairman of the board with general authority over the company's affairs conferred by amendments to the bylaws. Britton I, Budd, president of the Chicago Elevated Railroads and the Chicago, North Shore & Milwaukee Railroad, was elected president; John G. Learned was elected vice-president in charge of the commercial and new-business departments, and Julius L. Hecht was made vice-president in charge of engineering and operation. Charles A. Munroe resigned as vice-president, but retains his position as a director and a member of the executive committee. John H. Gulick remains vice-president in charge of finances.

New Vice-Presidents in Atlanta

F. L. Butier and W. H. Taylor Both Advanced by the Georgia Railway & Power Company

Two new vice-presidents have been elected by the Georgia Railway & Power Company. They are F. L. Butler, in charge of operation, and W. H. Taylor, former executive assistant of the company.

Mr. Butler joined the Georgia Railway & Power Company in February. 1921, as manager of the railway department and was made general operating manager of the company on Feb. 1, 1922, in charge of railway, electric, gas and steam heating departments. When he became associated with the company he took over the duties which until that time had been performed by W. H. Glenn, who resigned from the company to become president of the Shippers' Compress Company. At the time of his appointment to the company in Atlanta Mr. Butler was manager of the Winnipeg Electric Railway, which he served for three years, first as general superintendent and later as general manager.

Mr. Butler was born in Terre Haute, Ind., in 1874. At the age of twenty years he entered the employ of the Vandalia Railroad, now a part of the Pennsylvania system. He was employed in various capacities in several towns along the line of the Vandalia Railroad until February, 1909. He then resigned to become superintendent of the Denver & Intermountain Railway, Denver, Colo. He subsequently became vice-president of the company.

Mr. Butler resigned on Sept. 1, 1911, to accept the position of general manager of the Alton, Jacksonville & Peoria



F. L. BUTLER

Railroad, then under construction. Shortly thereafter he was appointed receiver of the company and later completed the line as far as Jerseyville, III. In July, 1913, he became general manager of the Chicago & West Towns Railway and of the Suburban Railway, with headquarters in Chicago, and remained in charge of those properties until April 1, 1918. He then resigned to join the Winnipeg Electric Railway.

Mr. Taylor is a widely known public utility executive, having been for seven years president of the Omaha Gas Company. He was located in Philadelphia as an executive on matters of appraisal before joining the Georgia Railway & Power Company Feb. 1, 1923.

Mr. Taylor was graduated from the Stevens Institute of Technology in Hoboken, N. J., in 1902 as a mechanical engineer. The bulk of his work for several years before he went to Atlanta was in connection with rate cases either as a witness or as a rate and appraisal expert.

He joined the Omaha (Neb.) Gas Company in 1913 as general manager of its properties, and shortly thereafter was elected president of the company.



W H TAXLOR

Prior to that time he was with the United Gas Improvement Company as engineer in charge of the gas and electrical properties on the main line out of Philadelphia. He had previously served with the Fulton County Gas & Electric Company, Gloversville, N. Y., for a period of three years, during which time he was also engaged in engincering work. While president of the Omaha Gas Company Mr. Taylor served on various committees for the American Gas Association and was also representative of the association in the lewa district. He was also president at one time of the Iowa District Gas Association.

New Operating Head, Chicago

G. A. Richardson, formerly vice-president in charge of operation of the Philadelphia Rapid Transit Company, has been elected vice-president Chicago Surface Lines, in charge of operation. He will enter upon the work of his new position at once.

Dinner Tendered General Andrews

Gen. Lincoln C. Andrews, formerly chief executive officer of the New York Transit Commission, was tendered a dinner at the Engineers' Club on Feb. 5 by his many friends among the New York railway men and members and employees of the commission. The occasion was the recent appointment of the General as receiver of the New York & Queens County Railway and general manager of the New York & Long Island Traction Company and the Long Island Electric Railway. It was an evening that the General will long remember for the expression of fellowship, admiration and well-wishing that was manifested by the character of the gathering and the talks of the guests.

The dinner marked the passing of the General from the field of regulation and his entry into the rôle of operator, which his railway friends took occasion to warn him, in jest, nevertheless with feeling, meant that his troubles now hegin. The evening was indeed one of play and celebration, though the fortyodd men present took awny with them a note of serious purpose from the very interesting and appealing talk by General O'Ryan, member of the commission, who characterized the world situation today as a race between the forces tending to destroy civilization and the time in which the United States can be brought to a realization of its obligations.

Those present at the dinner were Chairman George McAneny and Messrs. LeRoy T. Harkness, General O'Ryan and Sverre Dahm of the commission; Robert Ridgway, chief engineer of the commission; Frank Hedley, Judge James C. Van Sielen, W. S. Menden, C. E. Morgan, R. E. McDougall, S. W. Huff, W. G. Gove, J. S. McWhirter, J. S. Doyle, G. H. Pegram, J. F. Egan, L. V. Morris, George Keegan, Col. Merritt H. 'Smith, Dr. C. E. Lucke.

H. L. Brown, J. Waldo Smith, Thaddeus Merriman, Thomas Mullaney, T. H. Whitney, Arthur Peacock, E. A. Roberts, C. S. Cooke, Arthur McKinney, J. H. Madden, Dr. Edward Levy, E. T. Fitzgerald, Fred Wilcock, J. O. Shipman, J. E. Cooper, H. J. Alexander, R. H. Jacobs, J. T. Kane, J. H. Myers, C. D. Searle, Edward Dalton, George L. Lucas.

W. T. Masengill has been appointed superintendent and general freight and passenger agent of the Pacific Coast Railway, with headquarters at San Luis Obispo, Calif. Mr. Masengill, whose appointment became effective on Feb. 1, replaced J. M. Sims, resigned.

Donald F. Hine has resigned from the editorial staff of the ELECTRIC RAILWAY JOURNAL and Bus Transportation. The recent death of his father made it seem to Mr. Hine to be necessary to return home and take up a part of his father's duties as general manager of Fishers Island Farms, Inc., Fishers Island, N. Y.

Henry C. Truesdall was recently reappointed a member of the board of street railway control of Toledo by Mayor Brough. His reappointment is for a term of six years, beginning Feb. 1. Other members of the board are W. W. Knight and David Goodwillie. Truesdall was one of the original members of the board, his term being the first to expire. He is president of the Union Savings Bank, vice-president of the Northern National Bank and secretary Standard Steel Tube Company.

Merrill B. Knox has joined the editorial staff of ELECTRIC RAILWAY JOURNAL and Bus Transportation. He comes to the McGraw-Hill Company from the Chicago Elevated Railroads. where, as student engineer for the past two years, he has worked in several departments and gained a wellrounded experience in the elements of electric railroading. He thus brings to the editorial staff first-hand knowledge of the policies and practices of one of the leading railway operating organizations of the country, which has also been among the most progressive in taking up the bus. Mr. Knox will make his headquarters in the Chicago office of the JOURNAL. After graduation in 1920 from the Massachusetts Institute of Technology, department of mechanical engineering, Mr. Knox was for a short time employed as designer in the gas power engineering department of the International Harvester Company, leaving this position to enter the railway field. He received his early education in the public grade schools and the R. T. Crane Technical High School of Chicago, later continuing a junior college course at After Mr. Knox was gradu-Crane. ated from the Crane School and previous to matriculating at "Boston Tech" he was employed in the signal department of the Chicago & Northwestern Railway. During the war Mr. Knox served as seaman, second class, U.S.N.R.F., stationed at Boston. He was born in Goshen, Ind., Nov. 17, 1896.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Petroleum Activities Countrywide Through Expansion of Texas Company

What is known as "the complete cycle" in the petroleum industry has now been completed throughout the United States by the Texas Company, producers of Texaco petroleum prod-This complete cycle includes ucts. production, refining and marketing facilities, and the Texas Company now has facilities in all three phases from coast to coast and from the Gulf of Mexico to the Great Lakes. This complete cycle has been achieved by the recent developments and expansion of the Texas Company in the Far West, which was the link needed to make its activities countrywide. The production is from the company's wells in the Salt Creek Fields in Wyoming and the refining facilities have been accomplished by the erection of a splendid new refinery at Casper, Wyo. Along with these production and refining facilities has been the organization of a Western sales department, with headquarters at Denver, Colo., and the establishment of stations and other marketing equipment throughout the new territory. Fred W. Freeman has been named as general Western manager and H. W. Dedge has been appointed Western sales manager.

Interurban to Replace Rotaries for 60 Cycle

The Cleveland, Southwestern & Columbus Railway has closed a contract for the purchase of 60-cycle power to supply its entire railway and lighting and power service. This will mean the abandonment of its present 25-cycle power plant at Elyria, Ohio, and changes in its railway substation equipment to receive and use 60-cycle power. A contract for the power has been placed with the Ohio Public Service Company, which has a generating plant at Lorain, Ohio, in which plant considerable additional capacity is being added, and a modern plant at Melco, which is near Mansfield, Ohio, That company has transmission lines into Mansfield, Ashland, Lorain, Elyria and Berea, all points on the lines of the railway.

The plan is to purchase power at four different points on the railway property, namely, Elyria, Berea, Mansfield and a new additional substation which will be known as Chestnut. The power company will supply 22,000-volt, 60-cycle service direct into the present 22,000-volt lines of the railway, as this is the standard distribution voltage of both companies.

The railway will continue in use its 25-cycle transformer equipment for operation on 60-cycle service, but will replace all the present 25-cycle rotary converters with six-phase, 60-cycle machines. In making this change it is planned to equip four substations for full automatic operation and seven substations for semi-automatic operation, the equipment that is being specified for semi-automatic operation being such as is necessary to protect the station and to shut down the rotary in case of power failure, trouble within the station, and at night after the service is off the lines, the station being started manually by the agent.

The reason for making the change to 60-cycle service is that the company is faced with the prospect of extensive additions to the present equipment, building a new plant or the purchase of power. The location of the old plant has not the water supply to permit the evelopment of a large plant, and the economic solution of the problem is to buy the power needed for the system, which is available only as 60-cycle power.

Dates of Foreign Trade Meeting Changed

The dates on which the Tenth National Foreign Trade Convention will meet in New Orleans have been postponed to May 2, 3, 4, 1923, according to announcement which has been made by O. K. Davis, secretary of the National Foreign Trade Council.

The convention will devote special attention to the European situation, the part played by imports in our national life, and transportation by rail and water. Group sessions will deal with the practical details of export sales management, finance, credits, and advertising, with particular consideration to problems affecting the Gulf Coast and the Pacific.

Metal, Coal and Material Prices

Metals—New York Fe	b. 6, 1923
Copper, electrolytic, cents per lb	15.00
Copper wire base, cents per lb	17.125
Lead, cents per lb	8.00
Zinc, cents per lb	7.30
Tin, Straits, cents per lb	40.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hamp-	
ton Roads, gross tons	\$8,00
Somerset mine run, Boston, net tons	3,925
Pittsburgh mine rup, Pittsburgh, net tons	3.125
Franklin, Ill., screenings, Chicago, net tone	2.625
Central, Ill., screenings, Chicago, net tons	1,625
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per	
1,000 ft	7.25
Weatherproof wire base, N.Y., cents per lb.	17, 125
Cement, Chleago net prices, without bags.	\$2.05
Linseed oll (5-bbl.lots), N.Y., cents per gai.	92.50
White lead, (100-lb.keg), N.Y., cents per lb.	12.75
Turpentine, (bbl. lots), N.Y., per gal	\$1.44

Rolling Stock

Miami (Fla.) Traction Company recently purchased four new cars from the J. G. Brill Car Company.

New Brunswick Power Company, St. John, N.B., will purchase twelve new safety cars for one-man operation on the streets of St. John and suburbs.

New York & Queens County Railway, Long Island City, N. Y., has put into service twelve new one-man cars, the order for which was placed some months ago.

Connecticut Company, New Haven, Conn., suffered the loss of its carhouse in Meriden recently at an estimated loss of \$150,000. Eight passenger cars and eight work cars were destroyed with the buildings.

Augusta-Aiken Railway & Electric Corporation. Augusta, Ga., expects to put on fifteen new one-man cars for service in Augusta. It is expected the cars will be in operation by March 1. The cars were purchased from the National Safety Car & Equipment Company and were built by the Cincinnati Car Company.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has received the twelve new safety cars for use on the Milwaukee city line operated by this company. These are equipped with plush seats, double doors and are 4 in. wider than the single-door safety cars which the company has in operation in Waukegan, Ill.

Washington Railway & Electric Company, Washington, D. C., recently ordered ten more one-man cars. This makes a total of forty that will be added to the company's rolling stock during 1923. Some time ago an order was placed for thirty new cars of the most modern, pay-within type to be delivered early during this year.

Cleveland (Ohio) Railway will soon buy fifty new motors and trailers. A resolution asking the Cleveland City Council to authorize this has already been introduced and is now in the hands of the Council street railway committee. Fifty new motors are already on the way for the company. Some of these will be in service by March I. Not a single new car was added to the company's property during 1922, while thirty-eight were retired from service during that year, leaving I,478 revenue cars owned by the company at the start of this year.

Track and Roadway

Wichita Falls (Tex.) Traction Company has begun the extension of its lines about 1 mile. Workmen were placed on the job the next day after the franchise was arranged.

Los Angeles (Calif.) Railway will extend its Seventh Street line. About \$50,000 will be spent in extending the line from Hoover Street west to Vermont

Avenue. The work will take six months to complete.

New Brunswick Power Company, St. John, N. B., will lay new heavy rails on three streets, according to a recommendation of M. A. Pooler, general manager of the company.

Puget Sound International Railway & Power Company, Everett, Wash., has asked the County Commissioners of Snohomish County for permission to install new siding and wye track at Lowell, as part of certain contemplated changes in service on its Lowell line outside the city limits. The changes include additional track facilities and installing 195 ft. of siding.

Trade Notes

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., will equip the new safety cars for installation on the city lines in Lima with two Westinghouse 508-A motors and double end control.

J. G. Brill Company, Philadelphia, Pa., at a special meeting of its directors declared a dividend of \$1.25 on the common stock, payable March 1. This is the first dividend on common since 1908, when \$2 was paid.

Differential Steel Car Company, Findlay, Ohio, through its officials, announced on Jan. 26, that it would employ more men, as soon as steel deliveries speed up. The company has added traction snow plows to its list of products.

Paul T. Buckler, for fourteen years with the Detroit Stoker Company as manager successively of the Pittsburgh, Cleveland and New York offices, is now with the Power Specialty Company, for which he is assisting the New York office of the company in the sale of Foster superheaters and economizers

General Electric Company, Schenectady, N. Y., has received an order from the Philadelphia Rapid Transit Company for equipping the 520 new cars referred to in these columns of Jan. 27. The order consists of 1,040 G. E. 275-A railway motors, two motors for each car. In addition there will be control equipment and an air compressor for each car. The cars are to be manufactured by The J. G. Brill Company.

Royal E. Terhuae has been placed in charge of the northern New Jersey sales territory of the Uehling Instrument Company, Paterson, N. J., manufacturer of CO₂ recorders and other power plant equipment. Mr. Terhune was formerly associated with the Uehling Laboratories, and is, therefore, well qualified to co-operate with power plant operations on the important subject of power plant economy.

Ohio Brass Company, Mansfield, Ohio, announces that Tommy Jones has joined the sales force and will make his headquarters in Dallas, Tex. He was formerly with the Electric Ap-

pliance Company. William F. White-side has been appointed specialist in steam road electrifications. He was formerly with Westinghouse & L. M. Keating, connected with the Mansfield office for a number of years, has been transferred to the outside sales organization. He will take up his new duties about March 1, with offices in El Paso,

The American Engineering Company. l'hiladelphia, Pa., well-known manufacturer of Taylor stokers and A-E-CO marine auxiliaries, has taken over the Standard Crane & Hoist Company and the patent and manufacturing rights to the monorail electric hoist with the low headroom formerly known as the Standard. H. S. Valentine, chief engineer of the Standard Crane & Hoist Company, brings to the American Engineering Company his more than twenty years experience in the design and manufacture of hoists and the solution of material handling problems in practically every industry. He is directing the sales and supervising the manufacture of the hoists. The American Engineering Company has reorganized its No. 1 plant to accommodate the work of building and testing the hoists on a commercial basis and is now manufacturing them in quantity.

The Standard Conveyor Company, North St. Paul, Minn., has announced that it has acquired by purchase all the . rights, titles and patents pertaining to the well-known "Brown Portable" line of portable and sectional piling, elevating, conveying, loading and unloading machinery for the handling of packed and loose materials. This line of muchinery has been manufactured by the Brown Portable Conveying Machinery Company at North Chicago for ten years. Until further notice the plant will be continued in operation by the Standard Conveyor Company, and all inquiries and correspondence regarding "Brown Portable" products should be addressed to Standard Conveyor Company, "Brown Portable" Products Plant. North Chicago, Ill. The company also states that the organization which has so successfully developed portable conveying machinery, known the world over as the "Brown Portable" products for their merit, will continue with the Standard Conveyor Company in this line of work in which they are the originators.

New Advertising Literature

Irving Iron Works Company, Long Island City, N. Y., has issued Catalog 3A85, which tells how accidents are prevented by the non-slipping surface of the subway.

Quigley Furnace Specialties Company, New York, N. Y., has issued bulletin No. 53, describing and illustrating a method of reconstructing and patching boiler furnace walls. This method makes use of old furnace linlings which are crushed and then mixed with Hytempite to bond the crushed material.

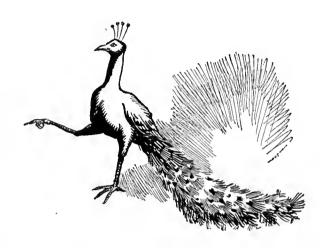
Why Peacock Brakes for Safety Cars?

Because—

if you don't have a hand brake which will really stop an *overloaded car* in an emergency, you may find the public authorities limiting safety car loads to seating capacity.

Because your motormen, in unreasoning opposition to the one-man idea, may try to use the claim that they are not safe in an emergency. They will be compelled to admit their safety with Peacock Brakes.

Because the most powerful, most reliable, most economical hand brake for safety cars is the Peacock Staffless Brake.



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It shouldn't be necessary for you to duplicate the experience of other managements which have experimented with inadequate hand brakes and have found them wanting.

Let us put you in touch with some properties where Peacock Staffless Brakes have become the adopted standard for safety cars as a result of wide experience with all kinds of brakes.



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15 pages 6 x 9, illustrated, \$3.00 net, postpaid This book is a compilation of practica methods used by repairmen and a renature winders. It gives in detail those methods which have been found by actual experience to represent best practice in a repair shop of average size.

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The desire for finer things is inbred in everyone, from the humblest to the highest in all walks of life.

It is the inate refinement of a

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plus mechanical perfection that draws the crowd of riders and insures for the bus operator a profitable investment.

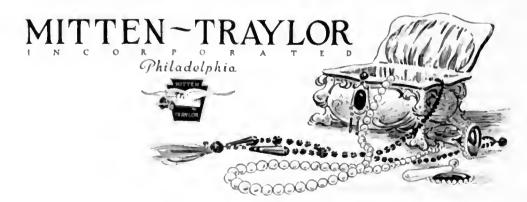
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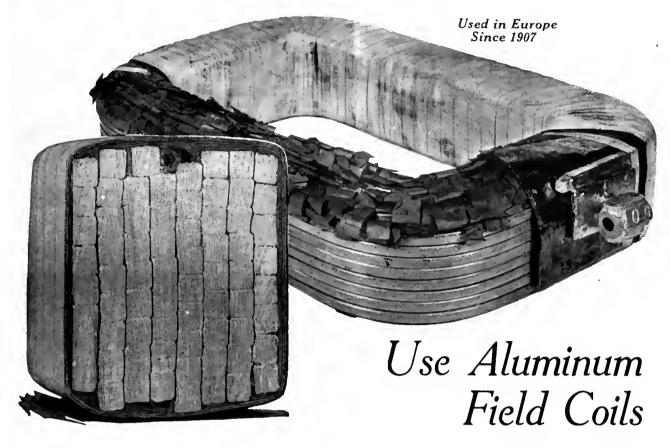
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The clean air, through proper ventilation—and the powerful, deep throated six cylinder bus engine all contribute to the irresistible "QUALITY APPEAL" of the MITTEN-TRAYLOR MOTORBUS.

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Illustrated Bulletin Sent on Request.

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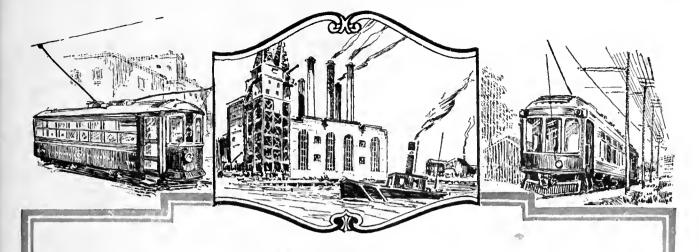
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their confidence

When a Texaco Lubrication Engineer is called on by a road to make recommendations for the lubrication of any piece of equipment—or all of it, for that matter, he says his say—and does his work with utmost confidence.

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First, of course, there's the fact that he knows his business. And he knows your business. He has been up against everyone of the working conditions, or mechanical problems which can come up on any road. If, by chance, he hasn't, then his colleagues have and the information is readily available.

Then, he knows that because of the adequate and ever increasing facilities of The Texas Company, lubricants will get there when needed. He knows that behind him is a big organization with hundreds of warehouses and thousands of tank cars, motor trucks and other equipment.

But more than all, he knows that behind all of this are the most modern and carefully conducted refineries in the Petroleum Industry. He knows of the scrupulous care and the constant rigid inspections which assure that each batch of any TEXACO Lubricant is always the same—and that the highest quality that scientific research and manufacturing skill has yet produced.

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And when it comes specifically to the lubrication of Street Railways, he has only to point to the millions of car miles on which TEXACO Lubricants are being used to promote economy and reduce maintenance.

And he knows, too, that the Company can take care of any lubricating requirement for rolling stock, track, power plant, substation—anything.

And of course he can tell you all you want to know about Burning Oils and Gasoline.

Let him tell you the story. It won't take long. He won't make promises. He'll offer proofs—and the value of these poofs is their dollar-and-cents basis.



\$240,000,000

A Great Bi

"I can think of no greater selling force that has your statistical issue. I refer especially to pages 2 Available for Bettering Operation"

These are the pages to which the letter refers

Electric Railways will spend this year

more than \$240,000,000 for new Plant and Equipment

Electric Railway Journal's March 17 covers the buyers.

Proven Improvements Available for

How MANY of these economy and betterment measures can you check off ☑ as done? How many can you check off ☒ as thoroughly considered and found not applicable to your conditions? How may blank squares remain to indicate backwardness or to show where your studies should be directed in 1923, if you are to keep pace with progress?

- Have you inaugurated a system for the periodic checking of traffic and the rescheduling of cars on all lines, so that service will follow changing traffic, avoiding wasteful car-miles but providing all the transportation that will be bought?
- Have your cars been rerouted to better serve traffic as material changes in course of travel have taken place?
- lete cars and substituted the use of lightweight one-man cars in light interurban
- Are you making full use of one-man charges, save energy and free the system from salety cars in city service?
- Have you entered upon a program of revision of the better existing cars for operation with one man on light interurban utilizing safety devices to improve safeness of such operation and for psychological effect on
- Have you substituted modern for ancient motors, saving weight and energy consumption, maintenance expense and road delays?
- Are you using a modern face collection Have you substituted machines for hand system with approved fare box and a modern system of fares, eliminating a lot of ticket extent possible in the track department? printing costs and accounting expense?
- Have you gone after freight business, in-

- Have you looked into the possibilities of hauling livestock?
- Are you using modern turbine equipment in your power plants, or are you retaining obsolete prime movers, reciprocating engines, or early type turbines, dissipating profits in wasted heat units?
- Have you modernized your generating plant by the installation of economical Have you discarded the ponderous obso- auxiliary equipment, metering devices and automatic control and test equipment?
 - Have you begun the installation of automatic substation control to reduce labor possibility of shutdown on strike of a handful of men?
- Have you given your line materials the same careful attention that you have rolland suburban lines and the lighter city lines, ing stock, track and power system? Many improvements in line materials and construction have been made which increase the life of the overhead and decrease the work and number of trouble crews.
 - Are you utilizing modern steel poles in the cities for economy, permanence and appearance?
 - work and saved labor costs to the great
 - Are you using the highest development in special trackwork to reduce the maincluding through service with other lines? tenance charges on both track and cars?

\$200,000,000

ying Force

n thrown out in many a day that compares with nd 21 under the caption "Proven Improvements

From a letter signed by one of the most successful sales managers in the Electric Railway field

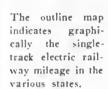
Bettering Operation	Are you using closed vestibules to reduce accident expenditures?	
Are you utilizing substitute ties where they would decrease the first cost and possibly extend the life of new and rebuilt track in paved streets? Are you using electric welding in connection with trackwork maintenance, but not carrying the welding to the point that it is more expensive than replacements? Are you employing the latest developments in rail joints? Have you substituted modern machine	Are you using automatic door engines to shorten the standing time? Have you installed automatic electric switches to facilitate the movement of cars and eliminate the delays that aggravate passengers? Are you employing train operation to handle rush-hour traffic or all-day traffic on extremely heavy lines, using motor and trailer or multiple-unit cars? Are you using automatic couplers to save	
tools for obsolete tools, and improved methods in the shop department. Are you conserving the time of shop labor, of track storage yard labor, and the storeroom help by use of proper material handling equipment?	time at the terminals, to reduce maintenance costs on inter-car connections and reduce hazard to trainmen? Are you using automatic slack adjusters to minimize inspection and brakeshoe wear?	E "a
Are you using an energy-saving device to reduce power bills, maintenance bills, and improve the general handling of cars? Are you deriving the saving in energy possible from the use of thermostatic control of efectric heat in the cars? Have you looked into the savings possible from inspection of cars on a kilowatt-hour	Are your cars cleaned periodically, other than merely swept out at night? Have you made use of improved metals for bearings in brake rigging and truck parts? Are you using anti-freeze devices to climinate pull-ins and delays due to frozen air?	
basis, particularly as against a periodic inspec- tion, but also in comparison with inspection on a mileage basis?	Have you made operation at railroad crossings safer by the installation of trolley guards?	
Are you utilizing the practice of dipping and baking armatures and field coils to reduce the number of electrical failures? Have you adopted spray painting, together with a fixed schedule for keeping cars brightly oainted for the sales value therein? Have you gone into the reclamation of	Have you installed signals to protect operation at dangerous points where the view is obstructed; and also where their application would increase schedule speed and reduce car-hour costs? Have you taken reasonable precautions to avoid damage claims by protecting grade crossings with automatic crossing signals?	
oil and waste? Are you using electric, thermit and gas welding and cutting equipment in the shop to reclaim worn or broken parts?	Have you minimized your insurance costs and fully protected your property by co-operating with insurance representatives competent and equipped to advise?	Ele

Every issue is a "great selling force"

Electric Railways will spend in addition

\$200,000,000 more this year for Maintenance

nual Maintenance Number Reserve Your Space Now





Where Street Railways Center Western Electric Can Satisfy Their Electrical Needs

Naturally continuity of this vital service demands nearby sources of electrical goods for servicing.

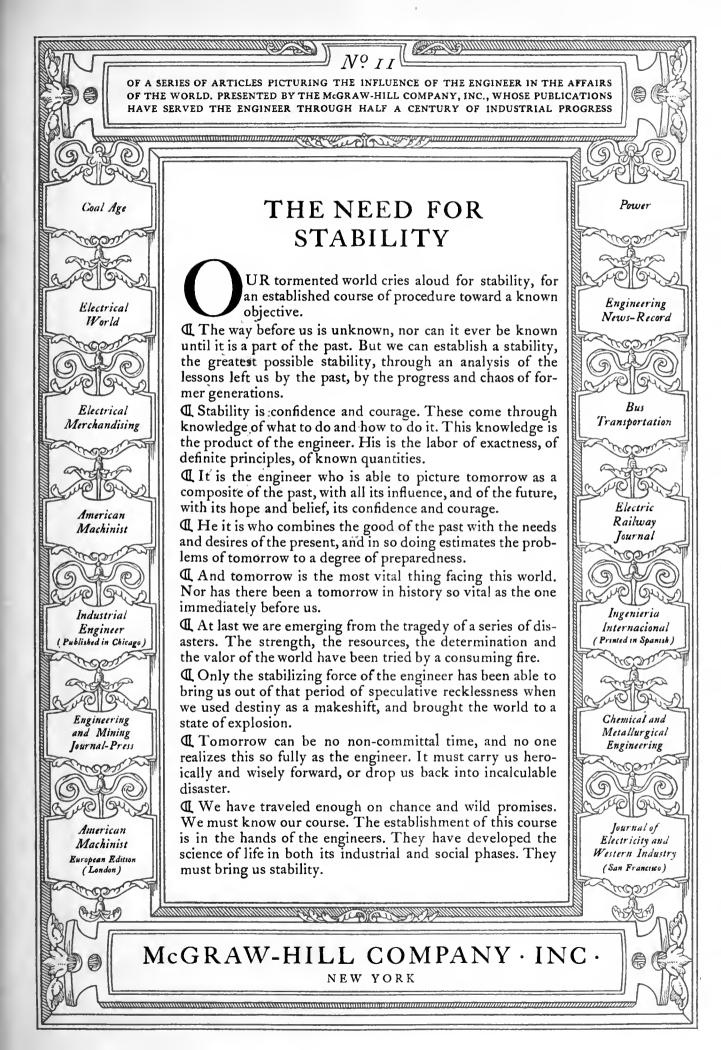
This servicing is provided by Western Electric National Service through its 48 Houses in the centers of trade and transportation named here.

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You have said this many times while using hand methods for work which could have been done in a fraction of the time with air tools. However, the erection of a stationary air compressor plant and piping up might have cost more than the air tools could have saved—and the job was too short to take the trouble and spend the money.

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I-R Portable Compressors are complete, compact plants -gasoline engine (or electric motor) air receiver, cooling system and accessories.

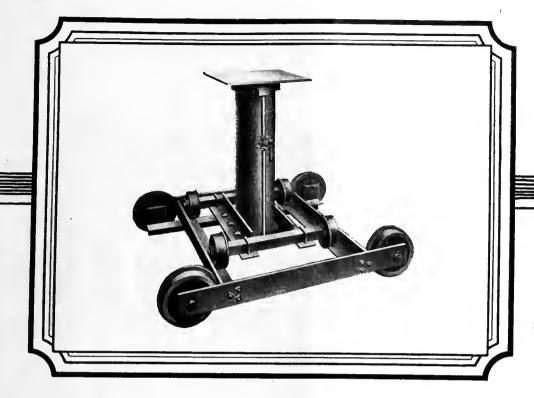
Gasoline Engine Driven—91, 160, 210 cubic feet per minute capacity Electric Motor Driven —91, 160, 250 cubic feet per minute capacity

With Air Power as portable as the gang's tool box can you afford to work without it?

11 Broadway, New York INGERSOLL-RAND CO..

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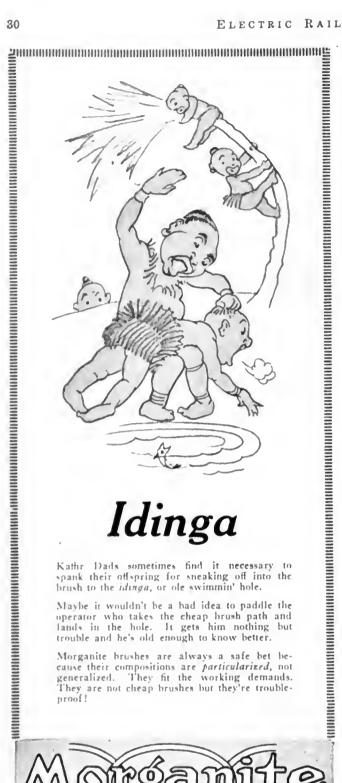
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COLUMBIA
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The auxiliary truck permits instant adjustment of lift to any position under the car. Height of lift is 40 inches and the stroke is $28\frac{1}{2}$ inches. The platform at top of jack is 16 inches square.

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> "ALL-HEART" "TIDEWATER"

Fencing, Ties. used for Material, Station Construction similar railroad requireand ments, to the very great economy of the companies using it.

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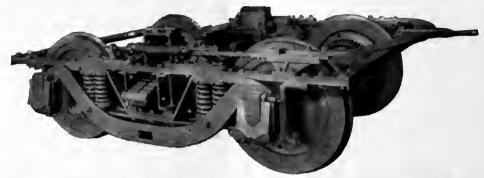
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Don't wait until you have a sleet storm and then wish for Nuttall Sleet Wheels and Scrapers. Order them **now**—be ready. And don't smile at the reminder and forget it. Every winter we express many, many shipments of sleet removing devices, showing that **some one** forgets.

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BALDWIN electric motor trucks are designed and built with the same engineering skill and excellence of workmanship as are Baldwin Locomotives.

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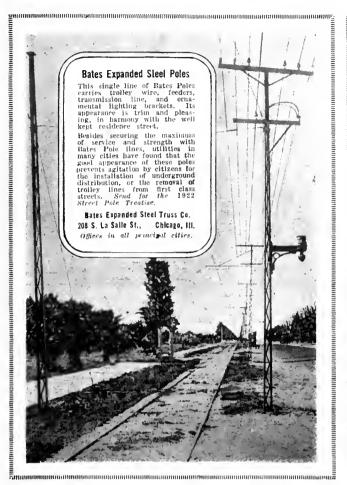
Have you noticed?

Any time, anyone, before any convention, has ever bragged of fine pinion records - the pinions always happen to be

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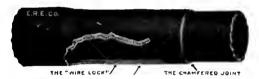
And yet we are told other pinions

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Lowest Cost Least Maintenance

Lightest Weight Greatest Adaptability

Catalog complete with engineering data sent on request

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SWITCHES-MATES-FROGS-CROSSINGS COMPLETE LAYOUTS IMPROVED ANTI-KICK BIG-HEEL SWITCHES HARD CENTER AND MANGANESE CONSTRUCTION

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Your best insurance against insulator breakage

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Treated railway ties, poles, piling, bridge timbers, etc.

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Grade 407 is universally recognized and adapted as the premier compressor motor brush on standard railway systems. One of a series of standard railway compressor motor brushes.

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Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

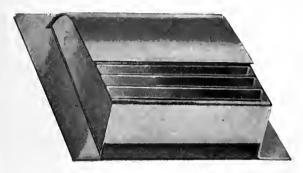
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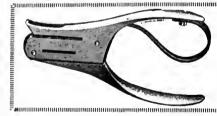
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high-grade R. R. Track and Car Jacks

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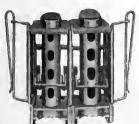


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The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requiremente, and to facilitate the addition of extra barrels.

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They talk for themselves

COST MORE PER BRUSH COST LESS PER CAR MILE

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The trolley wheel with the high mileage side bearing

Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. Investigate them.

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Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

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A Chain Holst that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to I factor of Safety. It's the only block that carries a five-year guarantee.

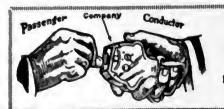
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DRAFTSMAN wanted by a manufacturer of special track work in the East. Must be thoroughly famillar with designing and detailing both steam and street constructions. P-501, Electric Rallway Journal, Real Estate Trust Bldg., Phila., Pa.

DRAFTSMEN calculators wanted on special track work. With or without experience but must have thorough working knowledge of mathematics. P-518, Electric Rallway Journal, Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

DIVISION superintendent, young, efficient, and progressive, desires position. Seven years experience. PW-513, Electric Railway Journal, 10th Ave. at 36th St., New York City.

ASTER mechanic desires position on small city or interurban property. I am at present employed and can give good references. PW-506, Elec. Ry, Journal, Old Colony Bldg., Chicago, Ill. MASTER

MASTER mechanic desires position. Twenty years' experience on city and interurban properties in shop work and maintenance of way. Good references, Central West or Western States preferred, PW-515, Electric Ry, Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic with 20 years' broad experience in electric railway field, thoroughly familiar with both high speed interurban, city lines and M.C.B. practice. Have been very successful remodeling old and building new equipment. Past and present records show I can keep equipment at a high standard at an economic cost. Present relations are pleasant, personal reasons for desiring change. References from men high up in electric railway field. PW-519, Electric Railway Journal, 10th Ave, at 36th St., New York City.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campaigns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-520, Elec. Railway Journal, Leader-News Eldg. Cleveland, Ohio.

SUPERINTENDENT of transportation or superintendent secret service. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant—personal reasons for desiring a change. PW-517. Electric Rallway Journal, Old Colony Bldg., Chicago, Ill.

WANTED position with Street Railway, have had more than twenty years' experience as superintendent transportation claim department and amusement parks, Good reference. PW-514, Electric Railway Journal, 10th Ave. at 36th St., New York City.

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are the most used means of obtaining positions and locating experienced men.

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find positions and competent assistants in the field served by this paper.

They invariably give a wide choice of candidates or satisfactory positions.

They are quick acting and cost little.

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Frequency Changer Set

25 cycles to 60 cycles 1000 kw.—1500 kw.—2000 kw.

State price, speed and voltages.

Albany Southern Railroad Company

James E. Hewes, Manager Rensselaer, N. Y.

WANTED TO PURCHASE

LATHE

A good second-hand, at moderate price, large enough to turn down car wheels 34 in, in dlameter. Address,

tt. D. HENDEE,
Asst. Supt. Burlington, Vermont,
Burlington, Vermont,

WANTED

3-K-35-D Controllers, complete. 1-Allis-Chalmers No. 302 Railway Armature.

NORTUEAST OKLAHOMA R. R. CO. Miami, Okla.

FOR SALE—A BARGAIN

4—Passenger Motor Cars—4

Weight 47,000 lbs. Geared 64-20 Single end cars-Leather upholstered seats Seats 44—Passenger Compartment 32 and Smoker 12

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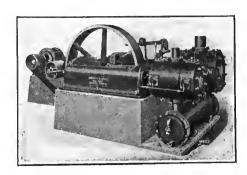
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ALPHABETICAL INDEX TO ADVERTISEMENTS

	Page	1/age	Page	Page
Acadey Brake & Supply Corp Alts-Chalmers Mfz Co Altson & Co. J. E. Amer. Brake Shoe & Filry, Co.	20 11	E	Lapp Ins. to. lin	Robiuson Co., Dwight P
American Raitan & Reed Miz- Co	38 34 34 21 21	F Feasiel, Robt, M 20 First Aul Specialty Co. 36 Flood City Mfg Co. 35 Ford, Bacon & Davis. 20 Ford Chain Block Co. 38 For Sale" Ads. 39	Marsh & McLennan	Samson Cordage Works
Proof Co. The. Baheock & Wileys Co	35	G Galena-Signal Oil Co	Nachod Signal Co , Inc. 34 Nashville Tie Co. 35 National Brake Co. 19 National Carbon Co. 36 National Vulumized Fibre Co. 36	Standard Underground Cable Co. 33 Star Brass Works. 41 Stone & Webster 20 Stuckl & Co. A. 44
Baldwin Locomotive Works, Barbour-Stockwell Co., Bates Expanded Steel Truss Co., Beckwith Chandler Co., Beeler, John A., Bemis Car Truck Co.	33 38 20	Griffen Wheel Co	National Preumatic Co., Inc. 13 National Railway Appliance Co. 41 National Tube Co. 14 New York Switch & Crossing Co. 31 Nichols-Lintern Co. 37 Nuttall Co. R. D. 33	Texas Co. 25 Thornton Trolley Wheel Co. 38 Tool Steel Gear & Philon Co. 32 Transit Equipment Co. 39
Ronney-Vehslage Tool Co Brill Co., J. G Buckeye Jack Mfg Co Buckeye Jack Mfg Co	45	Holst Englehardt, W	Ohio Brass Co	U. S. Electric Signal Co
Cameron Electric Mig. Co.	13	struction Co	P	Vacuum Oil Co Front Cover
Carneste Steel Co Cleveland Fare Box Co Collier, Inc., Barron Co Columbia M., W. & M. J. Co. Consolidated Car Fender Co. Ponsolidated Car Heating Co.	31 37 12 20 44	International Steel Tie Co	Parsons, Klapp, Brunekerhoff & Douglas	Want' Ads. 30 Wasoo Mfg. Co. 45 Western Electric Co. 20 Westinghouse Elec. & Mfg. Co. 2, 4, 5
Copper Products Forging Co	13	Jeandron, W. J	Rail Joint Co	Westinghouse Traction Brake Co. 6 Wharton, Jr., & Co., Wm 34 White Engineering Corp., The
Day & Zimmerman Co., Inc. Differential Steel Car Co	20 38	Kelly, Cooke & Co	Rallway Utility Co. 43 Ramano Ajax Corp. 36 Richey, Albert S. 20	J. G



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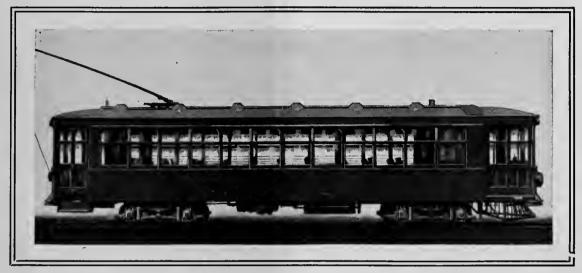
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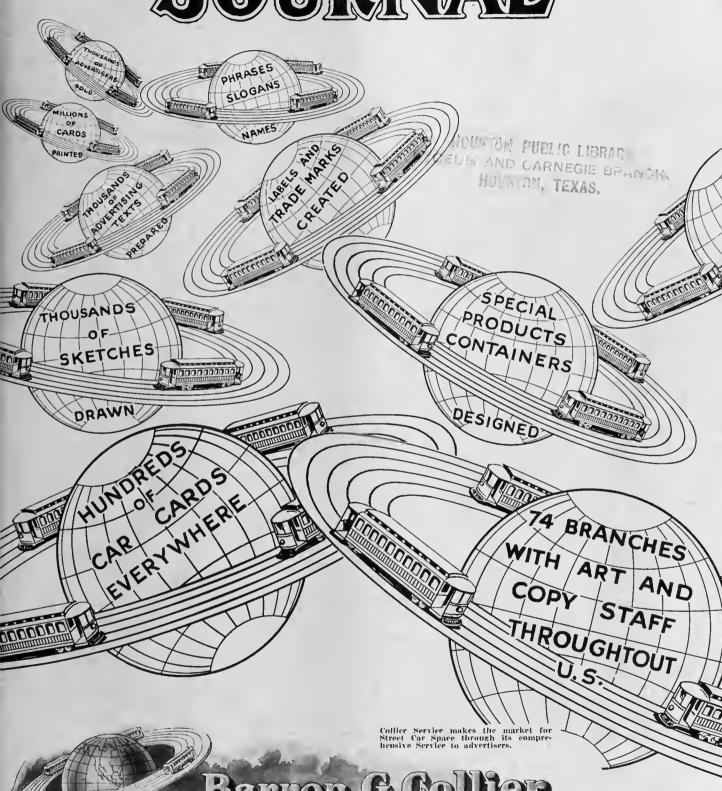
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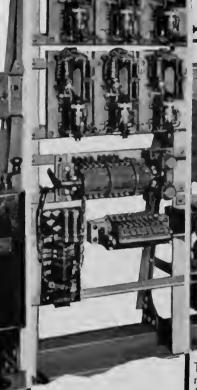


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CONTENTS

Editorials
Regulation from the Viewpoint of a Commissioner273 By Dwight N. Lewis. Street rallways are a necessity. The public is entitled to the
lowest rate consonant with an adequate return on the value of the property used.
Street Railway and Motor Bus Regulation
Relations of Utilities and Commissions
Electric Railway Taxation
An exposition of the work done a year ago in New York State by the legislative committee of which the speaker was chairman, with a consideration of methods of taxation.
Taxation and Regulation
How Should Railways Be Taxed?
Community Interest Between Railways and Bankers' Association
Country Past the Peak
Industry Coming to Better Days
Meeting at Washington calls to mind value of work of Federal Electric Rallways Commission. Important problems of industry reviewed.
Railways Emerging from Serious Conditions284 By Thomas N. McCarter.
Regulation and Taxation at Midyear Conference286
American Association News
News of Other Associations
The News of the Industry

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Newspaper Speed

THIS issue of the JOURNAL, which went to press on Saturday morning, presents to the readers the full report of the Midyear Conference held at Washington on Friday-morning and afternoon sessions and evening hanquet. This, again, is an example of the kind of service the JOURNAL editors take pride in giving the industry. It is another example of what can be done when a publication has the great facilities of the McGraw-Hill Company to draw upon, plus the will to do the intensive work required and to spend the money, for such service is costly. Following is a brief account of what it meant to get the full report of the Midyear in this issue, rather than to have the news of so important an event withheld from the field for eight days:

Instead of going to press as usual early Friday evening, the editorial forms were held a few hours. editors attended the meeting. relayed each other in taking down and writing the gist of the discussions. Our Washington office provided the stenographic facilities. All copy, as far as it could be written up to 3:40 p.m., was dispatched to New York by special messenger sent on the Congressional Limited leaving at 4 p.m. All further proceedings were telegraphed directly to the McGraw-Hill building, where our telegraph operator received it and turned it over to two editors to translate it into copy suitable to hand to the night shift of linotype operators. These editors and the make-up assistants stayed with the job all Friday night, seeing to it that the various pieces of copy were corrected and put together properly before releasing the forms to the waiting presses during the early morning hours.

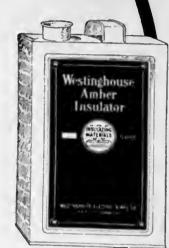


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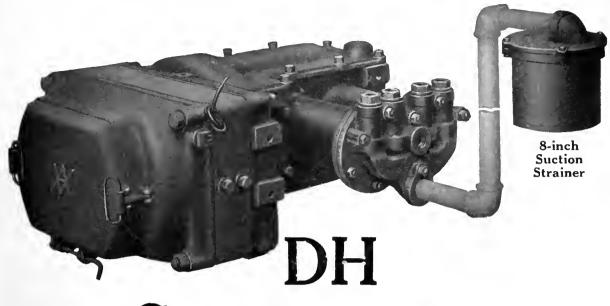
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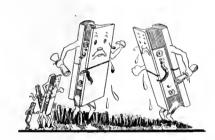
ONCE there was a railway manager who decided to save money by not rebonding the rail joints when they needed it. "What's the difference" he said "Nobody can see 'em and here's a chance to lay away a little fund for emergencies."

Which was all right for a while.

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The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

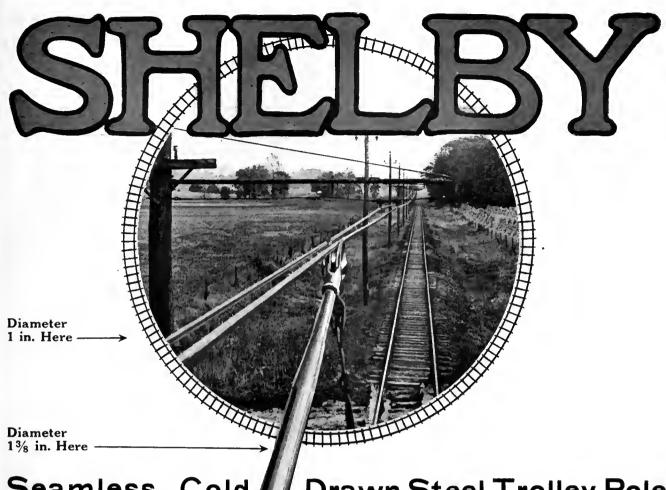
A large Eastern corporation, for example, was able to reduce its insurance cost from \$17.50 per thousand to \$4.30 per thousand, by carrying out the recommendations of our engineering service.

We will be glad to outline this service to business executives who are interested in reducing insurance cost.

MARSH & MCLENNAN 175 W. Jackson Blvd. Chicago, Ill.

Minneapolis New York Detroit

Denver Duluth Columbus San Francisco Seattle Cleveland Winnipeg Montreal London



Seamless Cold

Drawn Steel Trolley Pole

Where There's Strain THERE'S STRENGTH

In construction SHELBY TROLLEY POLES have much in common with fishing poles. Sudden jerks and drags exert strains on the butt of the pole in each case. Thus the butt must be stronger and yet the entire pole must be as light as possible.

Look again at the illustration of the SHELBY TROLLEY POLE. Note how the weight of the pole gradually reduces toward the point where the strain is lightest. In addition to its increased diameter the butt of the SHELBY POLE is reinforced on the inside, the reinforcement being made of the same material of which the pole is constructed-13 gauge Seamless Cold Drawn Steel. This reinforced member is made integral with the pole, its length varying to suit the requirements of strength.

SHELBY TROLLEY POLES are made in two types-Standard A and Standard B. While the three diameters remain the same in both poles the taper lengths vary, making Standard B pole about 20 per cent heavier and 50 per cent stronger.

> Every pale is tested in a specially designed machine which infallibly detects any imperfection, and any which does not stand the test is rejected.



Diameter

11/2 in. Here

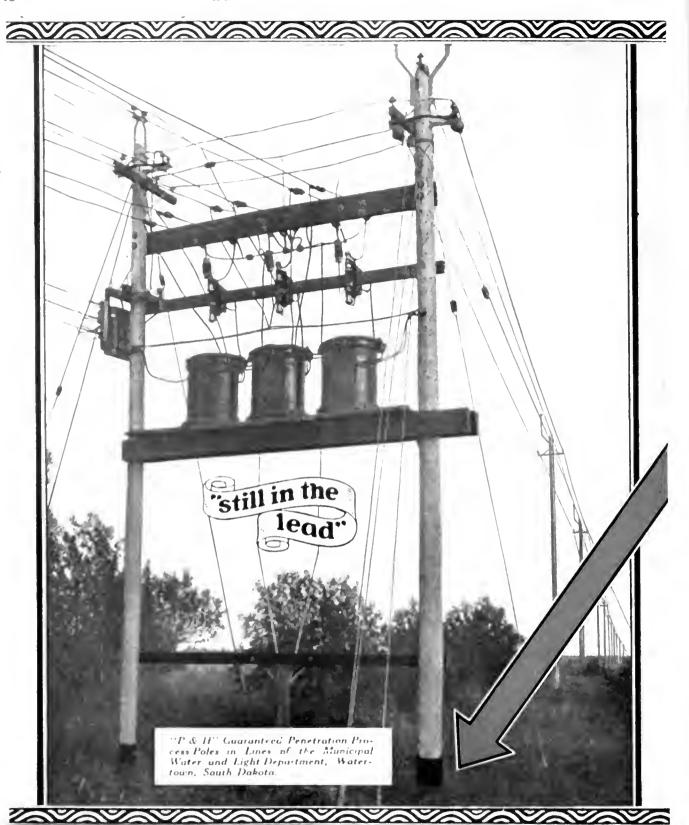
Electric Service Supplies Co.

PHILADELPHIA 17th and Cambria Street

NEW YORK 50 Church Street

CHICAGO Monadnock Bldg.

Branch Offices: Boston, Scranton, Pittsburgh Conodion Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver



PAGE & MINNEAPOLIS, MINN.

The Best Paying Pole Investment!

You get handsome dividends on the money you invest in the small additional cost of "P & H" Guaranteed Penetration Process poles. These dividends are realized in the form of lowered maintenance costs, fewer replacements and longer life of the poles.

Pole buyers and transmission engineers everywhere, after careful investigation, are enthusiastically endorsing the "P & H" Guaranteed Penetration Process as the best method of safe-guarding their investment in poles.

"P&H"Guaranteed Penetration Process

is backed by a written guarantee with every shipment, of a specified one-half inch uniform penetration of the preservative throughout the ground-line area of the pole. The Butt-Treating price will be refunded on any pole that does not test up to the specified penetration.

The illustration in this advertisement shows one of the hundreds of power and telephone lines in which "P & H" Guaranteed Penetration Process Poles are in use.

We can fill any pole needs—for Butt-Treated and untreated Northern White and Western Red Cedar poles—or for any form of Butt-Treatment.

Prompt shipment assured by the convenient location of our yards in the North Central and Western States.

Get the facts—write for interesting folder on the Butt-Treatment of Cedar Poles.

Copyright 1922, by P. & H. Co.

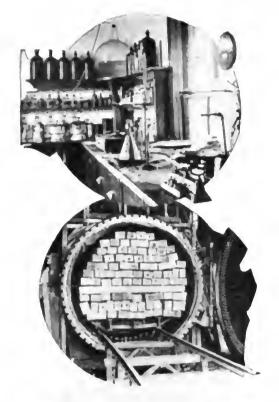
HILL CO.

New York, N. Y. 50 Church St.

Kensas City, Mo. 717 Bryant Bidg.

Houston, Texas, 1111 Carter Bldg.

Buffalo, N. Y. 950 Ellicott Sq. Bldg. Louisville, Ky. 1416 Starks Bldg.





Our Service Satisfies

THE value and magnitude of International Tie Service and facilities are best evidenced by repeated successful completion of annual tie production contracts for leading railroads of the United States.

Year after year we have produced, seasoned, treated, and delivered ties and always completed our contracts to the entire satisfaction of our railroad patrons. We solve their entire tie problem.

Our large scale production and our close and business-like relation with 10,000 small producers have developed a large merchandising organization to take up the slack between the tie producer and the railroads. Year in and year out, we accept ties and pay for them in cash at such regular intervals that ties marked with the International stamp are recognized as legal tender in these communities.

This value is established because our inspectors accept only sound ties and grade them in strict accordance with A. R. E. A. specifications.

This enforcement of a standard guarantees to railroads purchasing International ties—a good tie with more timber and more tie life.

We feel confident that we can save you money on your annual tie requirements.



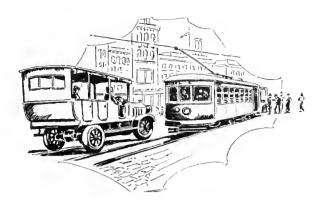
International Creosoting and Construction Co.

General Office-Galveston, Tex.

Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas



The Surface Car Still Leads Keep it ahead!

Although the motor bus has made a place for itself, and is undoubtedly destined to play a constantly growing part in every properly-developed, wellbalanced transportation system, nevertheless it has not and probably never can replace the good old surface electric car for handling mass transportation.

But the surface car must keep up with the times in order to hold its rightful place in the modern scheme of things. It must be fast and safe, capable of handling more passengers without congestion in shorter time. It is with National Pneumatic Equipment that these requirements are being met most successfully by the up-to-date electric railway companies.

To modernize and speed up transportation, plan on one or more of these National Pneumatic Devices.

NATIONAL PNEUMATIC

Door and Step Operating Mechanisms Safety Interlocking Door Control Multiple Unit Door Control

Door and Step Control Motorman's Signal Lights

Manufactured in Conoda by Dominion Wheel & Foundries, Ltd. Toronto, Ont.

National Pneumatic Company, Inc.

Principal Office: 50 Church St., New York

Philadelphia—Colonial Trust Bldg. Chicago-McCormick Building

Works-Rahway, New Jersey

Public Service 1720 Economy



To Save Power At The Car To Save Labor At The Car House

How It Inspects

This is a rugged watt-hour meter. Top dials for motormen's power-saving recards. Lower dials for car inspection

When the meter-driven hand on diol A reaches the marker set for this car at 6, the barnman knows that the brakes and controllers have done their work and are due for an inspection equivolent to that atherwise made daily.

Likewice diol B shows when the car has done sufficient work to require oiling. This supplants the usual time or mileage period lor oiling.

Dial C showe when the car has dane sufficient work to require general inspection.

After any inspection the meterdriven hand is set back to sera by means of its reset rod at the battom of the case.

A lock prevents unauthorized resetting of inspection dials.

The Economy meter with inspection dials is readily adaptable to ony electric ear or locomotive operating condition.

Meter The Energy—

Railway Co. Orders Meters With Car Inspection Dials

Every active passenger motor car now operated by the Public Service Railway Company in the State of New Jersey will be equipped with an ECONOMY METER with Power-Saving and Car Inspection dials.

This notable purchase follows a thorough investigation of power-saving devices.

Energy input is the correct measure of the relative efficiency of different men operating under similar conditions. The motorman has faith in a meter because with it he can prove that good operation gives him a good record and poor operation a poor record, in actual energy consumption. This power-saving device actually tells the motorman and the management whether power has been saved or wasted, and how much.

That, in brief, is the underlying reason for the success of the ECONOMY Meter.

The ECONOMY "Power-saving and Car Inspection" Meter provides a method that accurately and automatically shows when car inspection is needed. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much work the car

has done previous to the failure. All this without any clerical labor.

The ECONOMY Meter is a rugged device which requires remarkably little maintenance. Its principal element is also produced for central station and general metering. For this purpose more than 500,000 have been built. It is a standardized product, easy to maintain on a railroad at a cost averaging less than \$2.00 per year, per meter.

More than one hundred street or interurban railways are completely equipped and the saving resulting has more than wiped off the capital charges plus operating expenses of the meters in the first year.

The records from ECONOMY METERS are of high value for managerial and engineering purposes.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

National Railway Appliance Co., New York L. A. Nott, San Francisco Burton R. Stare Co., Seattle · Cable Address: Sangamo, Chicago Alfred Collyer & Co., Montreal, Quebec Ludwig Hommel & Co., Pittsburgh Grayson Railway Supply Co., St. Louis Detroit Railway Supply Co.

That's What You Want To Save



In 1914 this Phono-Electric wire was installed on a level stretch on Main Street, Bridgeport, Conn. The records show that 2,714,954 trolleys have since travelled this piece of overhead line. Yes—now look back, examine the cut more closely, and you'll come to the same conclusion as the railway company's engineers.

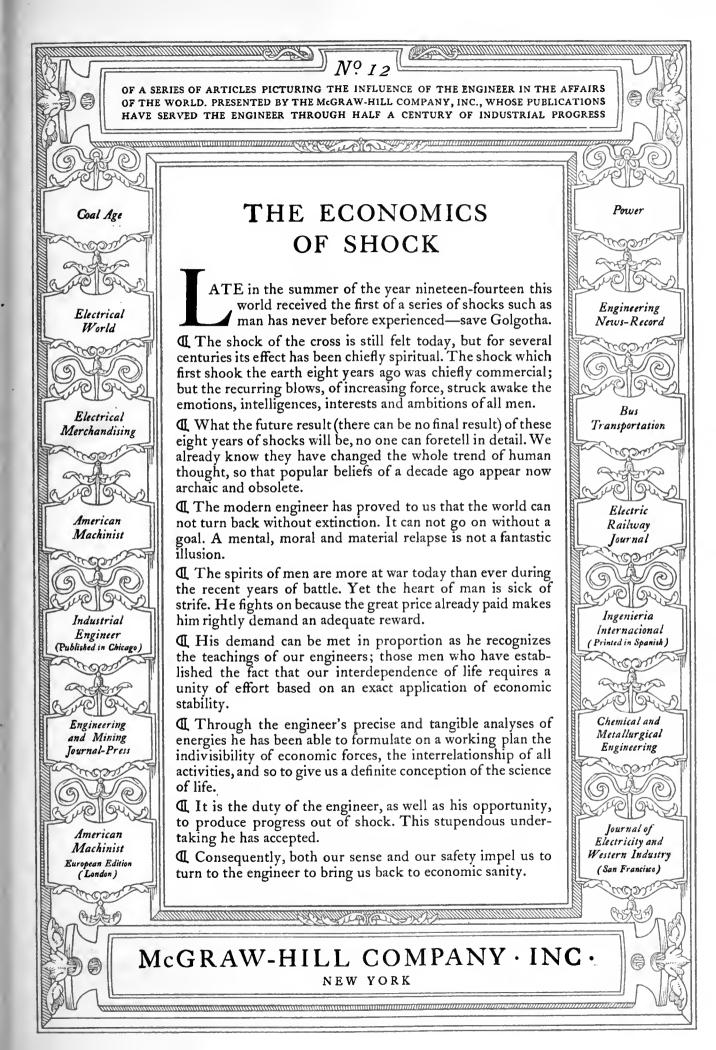
They took it down only because it was but a short length, and in the way, while they were stringing a complete new installation of Phono-Electric on this busy thoroughfare.

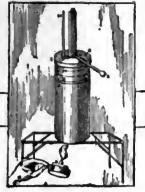
The long life of Phono-Electric — two to four times that of ordinary copper trolley — means such a reduction in maintenance and depreciation costs, that economical managements are adopting it as standard wherever traffic is heavy.



Phono-Electric—Its answer to WHY is WEAR!

Bridgeport Brass Company
Bridgeport Connecticut





They Weighed Airand Charles II Laughed



AMUEL PEPYS says in his diary that Charles II, for all his interest in the Royal Society, laughed

uproariously at its members "for spending their time only in weighing of air and doing nothing else since they sat."

This helps to explain why Charles has come down to us as the "merry monarch."

The Royal Society was engaged in important research. It was trying to substitute facts for the meaningless phrase "nature abhors a vacuum," which had long served to explain why water rushes into a syringe—the commonest form of pump—when the piston is pulled out.

Denis Papin had as much to do as anyone with these laughable activities of the Royal Society. Papin turned up in London one day with a cylinder in which a piston could slide. He boiled water in the cylinder. The steam generated pushed the piston out. When the flame was removed, the steam condensed. A vacuum was formed and the weight of the outer air forced the unresisting piston in.

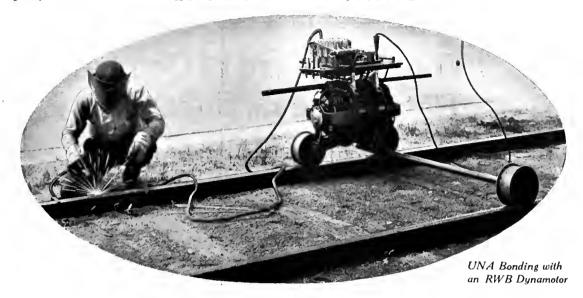
Out of these researches eventually came the steam engine.

London talked of the scandalous life that King Charles led, and paid scant attention to such physicists as Papin, whose work did so much to change the whole character of industry.

The study of air and air pumps has been continued in spite of Charles's laughter. In the General Electric Company's Research Laboratories, for instance, pumps have been developed which will exhaust all but the last ten-billionth of an atmosphere in a vessel.

This achievement marks the, beginning of a new kind of chemistry—a chemistry that concerns itself with the effect of forces on matter in the absence of air, a chemistry that has already enriched the world with invaluable improvements in illumination, radio communication, and roentgenology.

General Office Company Schenectady, N.Y.



UNA Bonding with a Dynamotor or Resistance Welder

Besides being a simple and quick method of bonding, the UNA Bonding process is very flexible. Either an RWB Dynamotor or a resistance welder of ample capacity will supply the necessary welding current. No change in the all copper UNA Bonds is required with either welding unit. Also, the same bond molds employed with a resistance welder are suitable with the Dynamotor. From a standardization standpoint these features are of utmost importance. They also provide a ready means for the installation of UNA Bonds on small as well as large electric railway properties.

Regardless of the welding unit employed — Dynamotor or resistance welder — UNA Bonds possess the same desirable features. Before

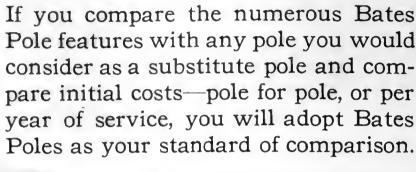
installation no grinding of rail is necessary. The all copper bond is simply placed in a mold against the rail. Then an electric arc is drawn. With this source of heat every individual bond strand is melted together in the mold with UNA metal. When the mold is full the bond is finished. The result is an all copper bond welded direct to the steel rails. The action of the UNA Metal automatically welded the copper head to the rail. The actual welding time required for a 410 bond is about one minute.

UNA Bonds are all copper from rail to rail. Thus, maximum power savings result as only copper carries the current. In this way the full value from bonding is secured. Send for additional information.

Rail Welding & Bonding Company, Cleveland, Ohio



"Your Standard of Comparison" Bates Pole vs. Substitute Pole



The unique simplicity of the one-piece steel pole, the sound economic features of design, the broad range of adaptability, and the ease and low cost of

maintenance are responsible for "Bates pole leadership" the achievement of a progressive organization.

STACOF	200	MIN	STEEL.	POLE	PRICES

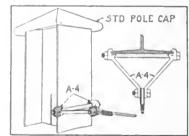
1.49-779	BET 1 00	FID OUT	127	SAFE
7 1917	LEUERS	POT#26	PRICES.	20420
		344	\$10.44	1540
		3.2.2	13.75	8000
86	6	604	16.67	2470
	*	696	19.99	3040
	6	20-6	12.00	1110
	6	408	10.69	1540
89	6	80%	18.40	2270
	7	623	20.21	2840
		3.29	13.26	970
	6	4.96	16.77	1420
E*	6	54.5	20.44	2040
	*	673	94.87	2940
	4	344	14.00	740
	6	443	14.14	1210
80		866	80.10	1789
	7	767	84.62	24/70
	4	4.27	10.09	670
	6	844	20 .20	690
28	4	797	84.77	1320
	9	87.0	00 fa	43.40

These are safe earling leads for areas line stresses with ample feater of safety ellowance, Leads are figured applied two feet from the two of safe.

Bates Expanded Teal Truss @

208 South La Salle Street, Chicago, U.S.A.

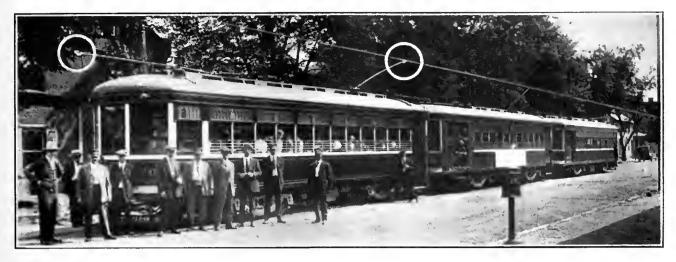
If you haven't the Bates Treatise on Steel Poles, write us for your copy.



Bates clips make connections to a Bates Pole a simple matter.

No Holes in the Pole.





Still another place where—



Miller Trolley Shoes

(patented)

make good in city and suburban service

A Tribute!

Just read these remarks from John M. Ritter, master mechanic of the Ephrata & Lebanon Traction Company, a Pennsylvania line operating city and interurban service, both for passengers and freight. And his remarks are seconded and approved by the general manager, Mr. H. A. Albin.

Mr. Ritter says:-

We have been using Miller Trolley Shoes for approximately five (5) years and now have them on all our cars. We operate city and interurban service, including multiple unit trains. We intend to operate one-man cars and will use Miller Trolley Shoes on them.

"We feel that the Miller Trolley Shoe has many marked advantages over trolley wheels such as better contact, longer life, freedom from arcing, needs no lubrication, does not dewire, and eliminates the objectionable noises in the car that are heard when trolley wheel bushings become worn.

"Our experience has been that Trolley Shoes do not wear the wire as fast as wheels.

"We find Trolley Shoes much more efficient than wheels because they need almost no attention at the carbara and the contacts are easily and quickly changed when necessary."

When such a road as this, and many others, find that Miller Trolley Shoes are more efficient and better in city as well as interurban service, that they do not wear the wire as much as wheels, and that they are actually more economical in every way—don't you think you ought to make a thorough test yourself?

Write for proposition.

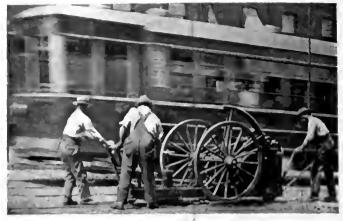
Miller Trolley Shoe Co. Boston 21, Mass.

Western Representative: Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.

Reciprocating Track Grinder

Atlas Rail Grinder

Universal Rotary Track Grinder



For removing all trace of corrugations from straight and curved track it has no equal. Most economical because the grinding blocks adapt themselves to the shape of the original rail head, and avoid unnecessary grinding and waste of metal.



An efficient rotary grinder, high-speed and light-weight, suitable for removing surplus metal after building up joints or special work. Its low cost will prove attractive.



An improved equipment with every refinement for fastest, most efficient and complete track grinding work. Tilting grinding wheel reaches every part of the rail head. Large rubber-tired derail wheels permit easy removal for passing cars,

RAILWAY TRACK-WORK CO.

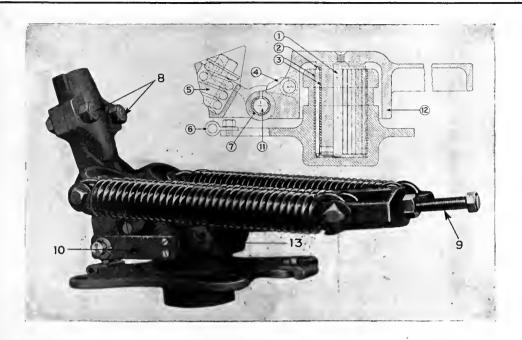
3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS

Electrical Engineering 4 Mtg Co

Atlas Bailway Supply Co-Chicago

P W Wood New Orleans Equipment & Engineering Co-London



Lest You Forget

How many of the Famous Fourteen Points do you remember today? The average man claims to remember two, but can't just think what they were. He lets George remember them.

But here are Thirteen Points we will never let you forget—the Thirteen Points of superiority, efficiency, safety and economy of the Nuttall 13-E Trolley Base.

- Oil Reservoir. Positively retains oil or grease and is exclusively a 13-E feature. To fill, remove the flathead screw shown in top of swivel cap.
- 2. Rollers and Cage. Rollers are hardened and assembled in a cage, which maintains alignment and permits assembly as a unit.
- 3. Races—Inner and Outer. The races are made of "SHELBY" tubing machined, hardened and ground.
- Trigger Lock. Locks Pole Socket in horizontal position, enabling one man to change poles in the barn under low headroom.
- Buffer Spring. Cushions the pole socket in case the wheel leaves wire.
- Terminal Connector. Cast Bronze Connector for sweating to Motor Lead insuring good contact. Clamp type furnished if preferred.

- Pole Socket Bearing. Hardened Steel Bushing maintaining indefinitely a good close fit with axle pin No. 11.
- 8. 2-Bolt Pole Socket. Two Bolts insure firmer grip and require less time for applying pole.
- Adjusting Screw. One adjustment for all four springs.
- Shunts. Heavy phosphor bronze straps for shunting the current from Pole Socket and Swivel to Base.
- Axle Pin. Pole Socket Axle Pin made of hardened steel.
- 12. Dust Guard. Protects Roller Bearing from dust and water.
- 13. Accessibility. By removing these heavy locking screws and unhooking springs, the bearing cap can be removed, exposing swivel portion of base.

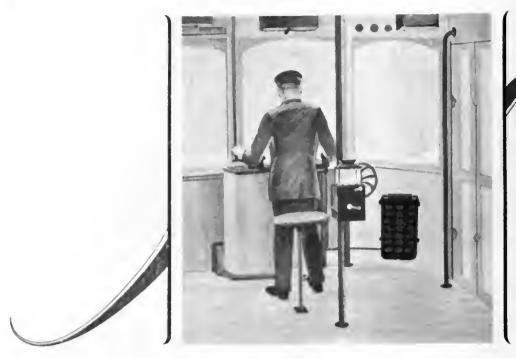


RDNUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Ele tric and Mfg. Co. District Offices are Sales Representatioes in the United States for Nuttall Electric Railway and Mine Haulage Praducts.

In Canada: Lyman Tube & Supply Ca., Ltd., Montreal and Taranta.





Help Him Keep His Mind On His Job

Keep the motorman comfortable and contented. Permit him to keep his mind on controlling the car and not on his chilled fingers and feet.

The CONSOLIDATED Stationary Cab Heater

An individual, neat, compact platform heater connected directly across the line. Independent of the main heating system and controlled at will by a simple snap switch.

Consolidated open coil construction, perforated case and open louvres at the top permit free circulation of air, delivering maximum heat with minimum current consumption.

Easy to install. Economical to maintain.

Let's tell you more about it





CAR-HEATING CO.



Galena Service

There is no word in the dictionary of modern business so generally used nor so greatly abused, as the word "service."

Literally, it means much—or should mean much—to the customer. Practically, it often means little or nothing, except perhaps a catchy term for salesmen's usc.

SERVICE, to the Galena-Signal Oil Company, is a pledge of honor, a duty—a sacred trust. Service to the customer is the one dominant aim of our organization. In no field of commercial or industrial activity is the word more faithfully or conscientiously exemplified than in the workings of "Galena Service,"

through the installation and delivery of efficient and economical lubrication to electric railroads.

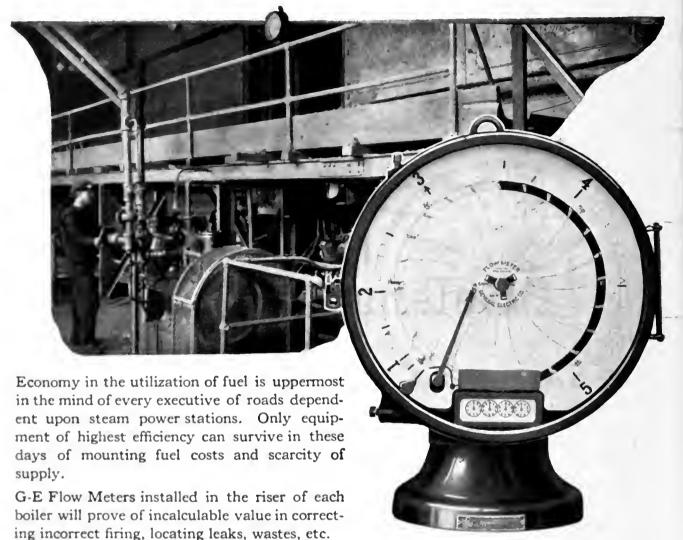
On representative roads in every section of the country Galena Service is giving daily demonstrations of its value as a cooperative force in attaining improved operating conditions through elimination of lubrication difficulties. It is giving practical proof of its ability to deliver maximum mileage, keep equipment in running order, reduce time losses and the repairs of bearing parts, and bring down the actual cost of lubrication to the lowest point ever reached in electric railroad operation.

"When Galena Service goes in Lubrication troubles go out!"



In 1923.

Fuel will be conserved as never before



G-E Indicating— Recording-Registering Flow Meter for measuring steam or boiler feed water

G-E Flow Meters used to measure feed water will be found accurate, thoroughly reliable and satisfactory.

Both steam and feed water meters can be supplied with elements recording pressure and temperature on the same chart with the flow.

Flow meter specialists in our nearest office will gladly assist you in working out any fuel conservation problems you have in mind.





ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 61 Ne

New York, Saturday, February 17, 1923

Number 7

Midyear Conference a Constructive Gathering

SPLENDID meeting, instructive, inspiring and en-A couraging, is the impression one has in reflecting upon the Washington midyear conference yesterday. J. N. Shannahan and J. H. Hanna, chairmen respectively of the program and dinner committees, may indeed be content with the success of their efforts in arranging the meeting, for which the industry is deeply indebted to them. The addresses not only represented the thinking of some of the best minds of the country on the topics considered, but the men who uttered these thoughts were of such position in public life that the expression of their views gave ground for encouragement that these views may some day prevail—to the deserved relief of the electric railways. A better appreciation of the good in state regulation was manifested, and, on the other side, a better understanding of what is good regulation.

Another outstanding value of the convention was the far-reaching impression made by devoting an entire afternoon to the subject of taxation, with which the electric railways were admitted by public authorities to be particularly burdened. This was the first time that taxation has been made a subject of the midyear conference program, and it developed information as to the magnitude of taxes, taking all forms together, that was startling even to many railway men. Some very pertinent suggestions were also made to remedy the situation, as noted in the report of the meeting.

The Electric Railways Are Not Without Friends

OULD any one retain a feeling that the electric railways are without friends among the representatives of the people after sitting through the midyear conference and dinner? There was a warm message from the President of the United States, who also received at the White House a body of the delegates representing the convention. The Vice-President of the United States came to the first session of the conference and made an address that showed his appreciation of the great public service being performed by our industry. The former Vice-President of the United States and the Secretary of the Interior honored the railway men with their presence at the banquet and made friendly and constructive addresses. The president of the national association of public utilities commissioners made the principal address at the morning session, and several other state commissioners took part in the discussion. A State Senator of New York was the principal speaker at the afternoon session and it was he who surprised many of the railway men with the information that in New York State the electric railways are paying 44 per

cent of their aggregate net income in taxes of all forms, frankly pointing to the injustice of this situation. In this figure only the roads showing a net profit are included.

Truly, could there be any greater expression of the respect with which the great electric railway industry is held or the appreciation of the tremendous public service it performs?

State Regulation a Development of Modern Utility Conditions

It WAS extremely appropriate that at a time when some states are talking about changing from state to local regulation of utilities, the American Electric Railway Association should make "Regulation" one of the two main topics for its midyear meeting. Many persons outside of the industry and even within it do not realize the great development in regulatory practice which has taken place in the short time, less than twenty years, during which the present form of commission with broad powers over utilities has existed in this country.

The statement has often been made that a principal reason for the appointment of the original state regulation was to curb the rapacity of certain utilities, but that changing conditions found the commissions obliged, if they were to carry out their duty of seeing that utility service was supplied at a reasonable charge to the public, to raise rates more often than they had to lower them. While this may have been true to some extent in certain states, it is an incident only of the very much greater work which has been accomplished since commission rule became general and which has resulted in the establishment of the principles of commission government. This has meant not only what the relations should be between the utilities and the public, but the manner in which these relations should be put into force and maintained by the commission.

Some pioneer work along these lines had been done, it is true, by the Interstate Commerce Commission, but state problems are not always like national ones, and where a difference of practice was required because of this fact, the best method had to be determined. The practice of the state judiciary also furnished some help to state commission practice, but probably even less in amount than the Interstate Commerce Commission, because while a state commission acts in part as a judicial body, it also has many executive functions, and often like a prosecuting officer has to take the initiative in making investigations.

Perhaps the state commissions which have been the most successful in their work have been those which have realized that the various commission laws have created a new kind of state agency, partaking of both legislative and judicial attributes, to settle certain ques-

tions relating to utilities. In consequence, they have developed to a considerable extent their own forms of procedure for making investigations, though guided in their conclusions by established judicial and commission precedents. While this new branch of our political system was a somewhat hazardous experiment, it has done well, and the results should be better as time goes on.

One definite function of a commission is that of stimulating a better understanding of utility problems by the public and of the public's problems by the utilities, before conditions get strained over matters which easily could be settled by agreement. This is one of the main points stressed in the paper by Mr. Lewis at the Washington convention. If the public can be made to understand that any particular cost or rate is reasonable, according to Mr. Lewis, it will be accepted. Here is where action by an impartial body is of value. Its opinion should carry weight with both sides.

From a Time of Pressure to a Time of Prosperity

A MOST encouraging note was sounded as regards business in general and that of transportation in particular in the morning session by Vice-President Coolidge, who honored the association by his presence Friday. The Vice-President was particularly qualified to talk to the members of the association, because, while Governor of Massachusetts, he had to give special attention to the electric railway problem of that State at a time when conditions were most acute. His ability satisfactorily to solve these problems is being shown by the excellent condition of electric railways of that State at present. Like every address which Mr. Coolidge makes, it was well worthy of the high office which he holds and shows him a close student of national conditions.

The address of Mr. Coolidge shows that he believes the prosperity of the country to be closely allied with that of its transit facilities, and the large business being done now by the steam railroads is indicative of an industrial change from a time of pressure to a time of prosperity. In this condition the electric roads should share.

Light on the Tax Situation May Lighten the Taxes

AXATION has been in force since the governments of prehistoric times were established, but it seems to have progressed very little as a science since the earliest days. While it is true the collection of taxes is not now farmed out as in Roman times, the taxation of today is most crude, inequitable, discriminatory and intricate, being based more on the principle of raising the tax from the persons who could not escape rather than those who are best able to bear it. As Senator Davenport pointed out at the Washington meeting this week, these crudities and inequalities have not, up to within recent years, caused a great amount of injustice in this country. This has been true only because the needs of government have not been great and the tax burdens have been light. The country has now passed into an era, however, when so many expenses are being defrayed by government that some changes are most necessary,

Incidentally the study of the taxatlon conditions in New York State by the legislative committee, of which

Senator Davenport was chairman, showed that of all of the business enterprises of the state, the utilities were taxed the highest, and among the utilities the greatest burden, when measured as a percentage of either gross or net earnings, fell upon the electric railways. To make matters worse, as Senator Davenport pointed out at Washington, these properties as a rule are those least able to pass this tax on to their customers because many are operating under fares established by franchise agreement.

While the conference on this subject at the Washington meeting did not bring out any solution, it did the next best thing, which was to show that there was a condition which should be remedied. One step in advance would be to carry out the suggestion made at the meeting that a study similar to that conducted in New York be made in other states. Another and one which any company can carry out is for it to determine exactly what its own taxes aggregate, including the paving burden, and make this point clear to the public, especially in connection with any rate increase. The public can then realize what part goes to the company and what are taxes.

By thus bringing light to bear on the real tax situation as it confronts the industry, the midyear conference may have served as the impetus for remedial measures.

A Change from State to Local Regulation a Backward Step

F REPORTS from Albany are correct there is growing I opposition in the Assembly to Governor Smith's plan to turn the clock back in the State, as regards utility regulation. The Governor reiterated his program at a meeting on Feb. 3 of the New York Board of Trade, at which he was the invited guest. He spoke again of the large number of changes which there had been in the personnel of commissions since 1907, about fifty-six different commissioners having served during that time. He also spoke of municipal operation of the water supply as an argument in favor of the municipal operation of the transportation utilities. He failed to point out, however, that the operating problems of the water supply systems and street railways are entirely different, and that if there have been frequent changes in the commissions it is the fault of the law by which such changes can be made, not of the principle.

If New York State changes from state to municipal regulation of its utilities it is safe to say there will be an outcry from local politicians all over the country for what they will call "home rule" over these same corporations. Naturally the local politician will want to get these utilities again under his thumb, but such a plan would tend to bring a return of the abuses which existed when this method of utility regulation was being followed before.

Governor Smith speaks about State regulation as involving divided responsibilities. Actually, when a board of aldermen or a common council is in charge of regulation, responsibility is much more divided than where the regulation is in charge of a State commission. Moreover, with a State commission acting under definite rules, with proceedings conducted entirely in public and with politics excluded, there is much more chance for both utilities and public that justice will be administered. With the introduction of the Governor's bill for New York City, developments may be expected.

Regulation from the Viewpoint of a Commissioner*

Street Railways Are a Necessity-The Public Is Entitled to the Lowest Rate Consonant with an Adequate Return on the Value of the Property Used—Customer Ownership Desirable—There Should Be Legislation Against Unfair Competition of Motor Buses and Trucks

By Dwight N. Lewis

Member Iowa Railroad Commission and President National Association of Railway & Utilities Commissioners

TREET railway companies would have fared better and left a better taste in the public palate if there had been a carefully planned and executed system of educating the public to their financial needs. The American public means to be fair. But when following the war, wages were reduced and the utility rates, including car fares, remained at a high figure or were advanced, there was a fruitful field for the blatant demagog to sow his seeds of suspicion and hate. Regulating commissions were anathematized if they dared to permit an advance in rates. The question caused overthrow of a splendid state administration of utilities in one of my neighboring states.

It is not easy for a regulating commission to serve the people of its state honestly. The man who desires office rather than be honest is too numerous to be entirely ignored. He inflames the public mind against the utility and against the utility commission, and we have today state legislatures discussing the abolition of state utility commissions or fearful of extending their juris-On the other hand, utility diction. companies are not always just. Some of them seem to think that regulating commissions have no thought but to follow popular demand, and that they recognize no function except to demand better service, at decreased rates. I know very many utility commissioners, and I know no finer, fairer set of men may be found in the public service. The utility commission is, above all things else, desirous of doing right, but to do right it must have the whole story.

Equally true is it that those representing the consumers of utility companies' products must be honest and sincere. If we could get both the operators of public utility companies and their patrons to understand that their interests are mutual, and that team work will produce enhanced service, at a reduced cost, most of the troublesome problems would be solved. Just a case in point. One of our transmission line companies furnishing light and power to many communities, under low contract rates, found, at the close of the war, that increased cost of fuel and other necessities had made a continuance of the rates impossible, without bankruptcy. The moment it suggested a raise there was an outcry and most decided objection. The public demanded



DWIGHT N. LEWIS President National Association of Railway & Utilities Commissioners

to be shown. It appealed to our board and, although we have no authority over rates, our electrical engineer made a careful survey of the plant, with analysiz of expense and earnings, finding that the cost of production was exceeding the rate charged. This was published in full by the transmission line company, was carefully examined by the public interested, and proper advance in the rate was actually agreed to by the consumers, and there was no court fight on rights of contract.

But the public must be shown.

CHANGED POLICIES BRING BETTER RESULTS IN DES MOINES

In my own home town the street railway company had for years been dealing at long range with city fathers and the riding public. There was a feeling, justified or not, that the management was too far removed from Des Moines and that the attitude of the owners was that Des Moines was a hick town out West somewhere and they would show those rubes who were running the street cars. It is hard to eradicate an ill sentiment in a day, and practically nothing was done to enlighten the public or to indicate to the car rider that the owners of the property cared a continental whether Des Moines people liked the way things were done or not.

When the people rose in revolt, no matter how wrongfully or rightfully, then the company sent diplomats. But

there was still the patronizing air of the Eastern provincial toward this uncouth Western brother. And our folks on Main Street didn't like that, and said so. Well, you know how it was. But we are getting to understand each other better now. Every week a little folder is issued to the public, taking the public into the car company's confidence, telling of its finances, its plans, its hopes, with even some good jokes in it, and while none of us likes to pay an 8-cent fare. I hear very little "cussin" of the street railway company, and the service is quite as good as a city the size of Des Moines has reason to expect. It is amazing to note the change in the attitude of the average man toward the company. Folks are fair, but when a question concerns public utilities, we are all from Missouri,

OPEN POLICY THE BEST

I have always insisted, when occasion has arisen, that public service corporations would have saved themselves much trouble, adverse criticism and oppressive laws if they had always been open, fair and square with employees and public. I know, and count among my friends, men who work for public service corporations in various capacities, trainmen, station men, motormen, conductors and others. They have discussed these matters freely with me. They have felt sometimes that their employers were not fair in discussing wage disputes; that they were concealing the real truth about their financial conditions. Sometimes they have come to me, and, when claims of unsatisfactory financial conditions made by managers of utilities have been confirmed, they accepted gracefully that which might have called forth a walkout. Such confidence must be had in utility companies that the public will feel absolutely safe in dealing first hand with such companies. I believe the greatest good a regulating commission can do is to bring about co-operation, mutual understanding and trust between the using public and the public service company, replacing suspicion with confidence, concealment with open understanding, and a frank, free, get-together policy all along the line.

As war seldom establishes a principle or adjusts a dispute, but, instead, leaves desolation and distrust to breed another era of hate, so complaints against public service corporations which must be decided by a utility commission seldom permanently settle anything, or bring about an era of mutual

faith and understanding.

^{*}Abstract of address presented at mid-year meeting of the American Electric Rail-way Association, Washington, D. C., Feb. 16, 1923.

There is much demand today in states having utility commissions that utility regulation must go back to the municipality. "Home Rule" is the slogan. I believe, in large part, this is due to the tendency of recent years for Congress to centralize in Washington authority in so very many affairs. People are getting tired of long range regulation, and demagogs are taking advantage of this to bait utility companies, especially steam and electric railways. Nearly all this outcry is based upon the fare charged, and the man in whom the public relies, instead of helping to clear up the situation, is oftentimes found capitalizing for his own political preferment the prevailing unrest and dissatisfaction with transportation service and charge

It is not easy for the public to understand that burdensome taxation of a street railway must be borne by the ear rider. We think we have put one over on somebody who owns the stock in an electric street railway when we require such company to pay for the paving between the rails and as far on either side as we think we dare go. The public should be educated to the fact that that misguided policy is one of the reasons for high fares. A town in my state, that could scarcely support its little street car system, undertook to require a lot of paving in the streets upon which the cars were operated, making the usual provision for the street railway company to pay the major portion of the bill. The street car company notified the City Council that when the paying was started on that basis the car system would be abandoned. An enlightened public, desiring car service at reasonable fares, will not sanction unjust and hurdensome regulations, either as to taxes or service, when it understands that those burdens must be reflected in the fare paid for a ride. State laws making burdensome requirements as to paving should be repealed. and the regulating power should be permitted to determine the extent of the car company's liability, if any, for any paving on the streets upon which street cars are operated.

PRINCIPLES OF REGULATION

Three fundamental principles must forever be used as guides in the regulating of utilities:

- 1. The people are entitled to good service at reasonable rates.
- 2. The public service company is entitled to a fair return upon the value of the property used in providing the Service
- 3 Competition in public utilities is waste, which must be paid for by the pentile

It is a notorious fact that utility companies, including, of course, street railways, went through the period during the latter part of the war and the years immediately following without adequate returns on their investments. It is only recently that the credit of utility companies has, in a measure, been restored This, of course, is in the public interest, and I believe utility commissions should honestly endeavor to see

is provided, such rates and fares are authorized as will restore the confidence of the investing public in the securities of such utility companies.

It is estimated by competent authority that the total capitalization of street railways at the present time is \$5,750,-000,000, of which \$2,500,000 is represented by stock. These stocks and bonds are largely owned by people who have invested their savings in them. and they are entitled to consideration by the managers of the companies and the utility commission or other regulating body. Twenty-three city railway properties valued by public service commissions or other public authority in 1919 indicated a property value of \$725,-096,077, as against \$794,594,660 total capitalization, an excess of capitalization over value of about 11 per cent. Statistics compiled by President Emmons of your association for 1922 indicated a hopeful trend.

High Spots Emphasized by Mr. Lewis

utility commission above all things else, desirous of doing right, but to do right it must have the whole story.

Folks are fair, but when a question concerns public utilities, we are all from Missouri.

Such confidence must be had in utility companies that the public will feel safe in dealing first hand with such companies.

The greatest good that a regulating commission can do is to bring about co-operation, understanding and trust between the public and the public service company.

The motor bus competition has been, in some cases, most disastrous to electric street and interurban railways. Nearly two years ago, in speaking before our state electric railway, light and power association, I advocated such legislation as would protect the public against the unfair competition of motor bus and truck. The bus and truck usually insist on paralleling, as near as possible, the electric interurban railway. To my mind, this is neither fair to the public nor just to owners of the interurbans. Already a committee of our State Senate has been in to consult our commission several times in the drafting of a bill properly to supervise and tax the motor bus and freight truck using the public highways. The cities out our way have had their fling with city passenger buses, and I believe are through with them, except, perhaps, as feeders for car lines, which I am glad to note your association believes in and advocates.

The motor bus should not be driven out of commission, but should be as strictly held to account as are street railways and should bear its proper

that, while proper and adequate serviceshare of the public expense. No legislation should be enacted that will prevent establishment of needed and desirable motor bus and truck service for the public good, but most assuredly established investment in street railways and interurbans should be safe guarded in the interest of good service to the public, against the piratical and destructive competition that has been so prevalent everywhere.

As my commission is not a regulating commission for street railways, I have stood on the side lines and watched the game. And like the man on the side lines, I have thought I could see where the plays might be improved. But I realize how different it is when one is in the thick of the actual conflict. Then decisions must sometimes be made and acted upon in the swift movements of

contending forces.

FUNDAMENTALS STATED

Street railways are now a public convenience and necessity, and, so far as I can see, will be for many years to come.

The public is entitled to the lowest rate consonant with adequate return upon the value of the property used.

Burdensome paving and other taxes should be removed by competent authority, in the interest of the car rider, so that he may have a lower fare.

There should be the utmost confidence in the inherent virtue of fair play in the American public, and there should be no concealment of operating results.

The public and the utility company should be educated to know that each is dependent on the other for the enjoyment of material blessings, and team work will accomplish what constant heckling by either side can never attain.

Excessive dividends, stock and otherwise, by some of the great corporations of the United States have led men to helieve that all corporations, including public utility companies, are getting enormously rich at the expense of the common consumer. The enormous profits gouged by some concerns out of the necessities of the people furnish the text for many a philippic against the public utility company, and against all aggregations of capital for any purpose whatsoever. In despair, some honest students of the question see the only solution in public ownership and operation. And, indeed, some owners of utility company stocks and bonds would welcome a sale to the municipality as a blessed relief from the bickerings and political fights necessary to go through to establish the sanctity of property rights.

I am glad utility companies are urging their employees and their customers to invest their savings in stocks and bonds of such companies, with plans for easy payment. It is the kind of public ownership in which I most heartily believe. With the stocks and bonds eventually in the hands of the workers and the users, and the profits of the operation (and there would be profit then) going to such persons, most problems of public relations would be

Railway and Motor Bus Regulation*

By Bringing Aggrieved Parties Face to Face, Many Troubles Which

Appear Insurmountable at First Will Fade Away

By Charles C. Elwell Public Utilities Commissioner, State of Connecticut

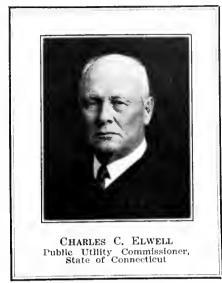
It is almost universally conceded that all organizations formed to supply a public utility, including transportation by rail and motor cars, should be under public supervision. For the purpose of regulating public service companies there have been established in nearly every state public utility commissions, which are clothed with power to make rules and orders which, if unsatisfactory to the parties in interest, may be taken on appeal to the courts.

A well-balanced commission will endeavor to limit the number of formal petitions and orders, acting preferably, as far as possible, as a medium through which differences may be amicably adjusted. Joint conferences with the commission and aggrieved parties bring the contestants face to face. This results often in a fading away of troubles and all parties separate with a much better understanding. Experience has shown that the utilities frequently need the advice and help of the commission, and in many cases what seemed to the utility at the time to be an unreasonable requirement has proved of great benefit.

Among the most important of our public utilities are the electric railways. Their systems are made up of numerous short lines, originally constructed to serve small communities. By the union of these short arteries of transportation we have in this country today a number of big corporations. The greater their number the more difficult the problem of the commission, as each management possesses very strong views as to the best method of handling engineering and transportation problems. It devolves on the regulating body, in order to secure uniformity, to settle questions of method and manner of construction, to rule on the type of equipment to be used, approve standard signs and signals and, as far as possible, establish uniform rules for operation, to investigate accidents and make suggestions with a view to preventing similar accidents in the future. The most perplexing of all the problems confronting a public utilities commission is establishing rates that will give sufficient revenue to operate the utility, pay a reasonable return on the capital that is invested and at the same time satisfy the public.

During the recent war the costs of labor and material advanced so rapidly that the fare rate did not keep pace. Electric railways all over the country operated at a loss, while hundreds of miles of road which had been profitable previously were either forced into receivers' hands or abandoned altogether. In 1920 there were being operated by companies in Connecticut 776





miles of electric railway; since 1920 65 miles have been discarded and at the present time 120 miles are being operated by receivers. People objected to paying a higher rate of fare than 5 cents with a transfer privilege, making it possible in many cases to ride 15 miles or more for one fare. This was not only unjust to the company but to the short rider as well. Many plans were discussed by our commission and the companies with a view to establishing rates that would correspond more nearly with the miles traveled, and several tests were made, but all proved unprofitable, unpopular and difficult to operate.

A return to the original fare limits followed a trial of the second distance tariff scheme and the rate advanced to 10 cents, resulting in increase of revenue, which, after fifteen months, was found sufficient to warrant a reduction to a token fare of 83 cents. A further modification is expected on April 1, when the token fare will be lowered to 72 cents. The State Legislature of Connecticut in 1921 relieved the electric railways by reducing taxes, bridge and paving obligations, and further by declaring jitneys common carriers and placing them under the jurisdiction of the Public Utilities Commission.

The jitney made its appearance in Connecticut in 1915, and for about six years ran over the streets and highways, and the general public as well; they were unrestricted and unregulated; they operated when and where they pleased, and finally became so numerous that they fought among themselves, seeking in some way to reduce their own ranks in order that a reasonable number might survive. The routes chosen by the jitney usually paralleled the street railway and steam railroad lines, causing a substantial decrease in

the revenue of both. Two years ago the perplexing question of regulating this seething mass was placed in the hands of our commission; hearings on the question of public convenience and necessity were held in all parts of the State, resulting in a reduction of the number of jitney operators from 1,000 to 225. Today, in place of reckless, independent and irresponsible drivers, we have a very respectable lot of jitney managers, including such men as Lucius S. Storrs, whom you all know is a pastpresident of this association, and I venture to paraphrase the immortal bard and say, To what base use we mortals come at last!

Mr. Storrs has read the handwriting on the wall and very wisely is "getting in out of the wet," realizing that there is a public need and demand for bus service, which can better be provided by the trolley management than by a large number of jitney operators.

The Public Utilities Commission has a superintendent of its iitney department, who has general charge of their regulation. At the present time there are eleven companies or corporations and forty-nine single operators running jitneys in Connecticut. All have been given certificates by the commission when as a result of hearings it developed that public convenience and necessity required them. These certificates are good until revoked by the commission for cause. There are posted in each car, for the benefit of the public, the rates of fare, schedules, etc. All operators are licensed and governed by various commission rules. By virtue of the law, electric railways may operate buses without a certificate from the commission. Our jitney operators have a state organization, headed by a president who is a lawyer. Different districts of the state are represented on the board of directors, which meets monthly. It was prophesied there would be bills presented to the Legislature now in session providing for the repeal of the jitney law or a modification whereby many of the old jitney lines might be restored. The limit set for presenting bills has passed without any such requests appearing. The few bills affecting jitney transportation which have been introduced were first submitted to the commission for its criticism and approval.

MOTOR BUS OPERATION WILL INCREASE

I do not look for any further extensions of street railway transportation, believing that buses will be employed on streets and highways which are built and maintained by municipalities. People want to retain the street railways, but they 'lo not frown on the jitney, some communities even showing a marked preference for such means of transportation.

As an operating railroad official, when unhampered by those above me, I was fairly successful in getting close to the patrons of my division, and now as a commissioner I am constantly suggesting a closer union of the utility companies with the public. This unity cannot be accomplished by following any

fixed line of procedure, but in all cases, in order to obtain the best results, the initiative must be taken by the highest official of the utility, if he expects to win the confidence and co-operation of those who, in the case of railways, furnish the money to keep the wheels turning.

Many of the "big bosses" are too old-fashioned and must be "born again" before they can expect to accomplish much along these lines, but if they once do "hit the trail" and make a determined effort they will be surprised to see their example spread through the different grades, reaching even down to the lowest employees at the foot of the list, and, after they get the habit, the perplexing problem will be solved. But remember, "the old man" must take the lead.

It is my opinion that electric railway presidents have too many high fences erected between themselves and their kicking patrons, which gives them an excuse for the many letters appearing in the kickers' column of local papers. Straphangers never have a chance to even see the head of the bloated monopoly, who, they claim, is getting richer and richer day by day in every way, even going to the extent of jacking up trolley fares at the slightest pretext. I suggest when you go home to-morrow that you rip out those gates with their concealed latches, which, expert that I am, will not respond to my manipulations -I mean the gates that always swing out when you want to go in, and swing in when you want to go out, and that have stationed behind them men who demand one's card and business and who confuse the caller so that he can't tell even his own name, but if he finally succeeds, the porter always returns, after five minutes absence, bringing the same old message, "The president is busy just now, and suggests seeing the superintendent," who, by the way, has heen seen several times without obtaining satisfaction. After such an experience the truth seeker leaves the president's office and if gifted tries his hand at writing for the papers, or, if not, takes it out by applauding the regular writings of Veritas and Vox Populi, cussing the company from the top to the bottom, as he sings, "I'll never go there any more."

HAVE AS "AT HOME" DAY

Establish a calling day. Put a notice in the papers that "You will be at home on Wednesdays from two to three, when you will gladly meet those having any fault to find with your management, or consider any suggestions that will make you a better servant of the public." The gate, if you still have one, should be fastened wide open and the porter instructed to take a facial massage to iron out that look which should be replaced with his broadest smile of welcome for Mr. Public, the man for whom you are all working.

You can answer all questions by the help of charts and diagrams, showing your visitors why you cannot do all they think you should, but when the people find out how easy it is to meet the president and what a fine fellow he is, very few will come, if any, and you will have ample room in your office for like conferences in the future.

The greatest assets any utility can have are the good will of its employees and the confidence of the public which it serves—assets obtainable and retainable only by according fair treatment to those who are on its payrolls and by giving good service to its patrons. Our commission is forbidden by law to interfere with the contracts between public utility companies and their employees, but it can, and will, insist on service that is reasonably adequate, not forgetting, however, that the obligation rests upon it to see that the rates charged are sufficiently high to provide service that is ample and dependable.

Relations of Utilities and Commissions*

Entire Confidence of the Public Toward the Electric Railways in the Community Must Be Established Before Regulation Can Be Made Satisfactory to All Parties

> By Col. Charles Keller Corps of Engineers, U. S. A. Engineer Commissioner of the District of Cotumbia, Chairman Public Utilities Commission

THE law creating the Public Utilities Commission of the District of Columbia was passed March 4, 1913. Under this law the Public Utilities Commission of the District of Columbia consists of three members—the Commissioners of the District of Columbia, who, when serving as Public Utility Commissioners, perform this added duty without further compensation. Jurisdiction is limited to the boundaries of the District of Columbia, which contains 69 square miles.

Until after the World War had been in progress for some considerable time no important public utility problem, other than the valuation of the various companies doing business in the District of Columbia, had arisen. Since then, however, we have had the same experience as other communities. Mounting costs have necessarily compelled the fixing of increased rates, and while neither street car fares nor any other public utility rates are now at the high points, they are still considerably above the pre-war rates, and to that extent they afford play for the operation of that human weakness or fallibility which tends on occasions to find fault. For some reason or other, difficult to understand, human beings otherwise reasonable seem to take a most unreasonable attitude in regard to public utility companies, particularly street car companies. It may possibly be because payment of car fare is a cash transaction that takes place two or more times every day and that the performance of this cash transaction causes irritation which its frequent repetition exaggerates. In any event, people who would hesitate to ask a merchant to sell his goods habitually below cost seem to feel that there is nothing out of the way in demanding that a street car company shall furnish service at cost or less. This mental attitude, hard as it is to explain, is exaggerated by the demagogue whose stock in trade it is to attack public utility rates without reference to their fundamental fairness.

*Abstract of discussion read at midyear meeting of American Electric Railway Association Washington, D. C., Feb. 16, 1922 The public mind is seemingly never properly adjusted so far as concerns street car rates, and it seems difficult to get a hearing before the public at which the underlying facts may be fairly set forth and safely left to the sense of fairness of the whole body of well-meaning citizens.

Summing up Mr. Lewis' paper, it might be said that what he endeavors to inculcate is a spirit of complete fairness on all sides of the public utility problem. He wishes the street railways to demand no more than a fair return upon the value of the property used in serving the public, and he believes that competition in performing public utility service is wasteful, and inferentially that it should be prohibited. These conclusions might be tersely summed up in the Golden Rule-the willingness, the anxiety, of every party engaged in giving or receiving public utility service to treat all other parties as they would desire to be treated themselves. must all agree that the rule deduced from Mr. Lewis' paper is a fine and worthy one, but experience shows that the rule is more often discussed than practiced in business affairs. Until the public utility companies everywhere have created in the public mind a belief in the entire good faith of their policies, demagogues and men of ill will generally will be able to mislead the public mind by fantastic tales of all kinds, so that it behooves the enlightened men who are the trustees and custodians of this vast interest-the American Electric Railway Association-to do what they can to educate the public and to stimulate public belief in street railway policies. This cannot be done by discussions before such a body as this, or even by articles printed in technical or trade publications. Apparently it can be done only by publicity conducted in the community affected, accompanied by works confirming assertions of good faith. As illustrating what I mean by works, I will refer to a specific case.

The Public Utilities Commission of the District of Columbia, practically as soon as it was organized, entered upon the valuation of the various companies doing business in the District of Columbia, such valuations being required by the law above referred to. These valuations were begun in 1914 and concluded in 1916. Naturally they were affected by all the variable and conflicting factors consequent upon the war; and it would have been unreasonable to expect that the valuations, however large their totals, would be accepted without protest by the companies concerned. No criticism can therefore justly be made of any company that challenges these valuations, because in its opinion the unit prices used therein were too low, or because the valuations did not, for example, cover the complete cost of reproduction. Differences of opinion might with great propriety arise as to these and other details; but I believe that it is not speaking too strongly to say that when a valuation is challenged, not only for these reasons but because it fails to include allowances for inflated assets in the way of rights of physical property never used in the public service and for commissions or cash payments alleged to have been made to purely speculative promoters, then the public may well be excused if it turns a deaf or skeptical ear to other and possibly more meritorious pleas. I suggest that in my opinion the regulation of public utilities can be made satisfactory to all parties concerned and almost automatic in its operation only when that complete confidence upon which alone satisfactory business dealing can be based has been established in the community concerned. I have no doubt that when this millennium dawns, those of the present generation of public utility commissioners who are not then numbered with the angels, elevated or fallen, will gladly join in the chorus of praise.

Electric Railway Taxation*

An Exposition of the Work Done a Year Ago in New York State by the Legislative Committee of Which the Speaker Was Chairman, with a Consideration of Methods of Taxation

By Hon. Frederick M. Davenport

Senator from 36th District, New York State, and Chairman of the Special Joint Legislative Committee on Taxation and Retrenchment

AXATION has always been rather a hit and miss affair in most of the states of the Union. The subject of taxation requires a pretty wide information and a knowledge of underlying scientific principles which are to a considerable degree lacking in both legislative and administrative circles. It is technical, and the men who have the capacity to master it are apt to choose something else upon which to exercise their mental acumen.

In the early stages of the history of this country, taxation was not so vital a matter as it is now. There were comparatively small expenditures, and all the government had to do when it needed funds was to lay a tax on the nearest thing at hand, the thing that couldn't get away.

At first the government laid taxes on heads-poll taxes-they could not get away very easily; on land, that could not get away, and on the public utility corporations, because they could not pull up their tracks and pull down their transmission lines and take them over into another state very easily.

I have noticed vast differences between the ways in which the manufacturing companies and the public utilities are treated with respect to taxation. The manufacturing corporations got away without much for a good long time, and their assessments of taxes were less than those of other bodies. The reason was that the corporations would threaten to move from the state. But

taxes were small, it did not make very much difference if there were slight inequalities or injustices. The country was rich as a class, and almost any person could stand the taxation of that day. All that has now been changed.



F. M. DAVENPORT New York State Senator

Taxation has become one of the most vital issues of the world. Misgovernment shows itself in overwhelming taxation. The matter was considered so important that the State of New York, where I have had my experience, undertook a study of its existing tax system a year and a half ago. We had a staff of engineers on an absolutely nonpartisan basis, and the chief men on it were not theorists but statisticians. Their findings were submitted to tax officials and others interested in every quarter of the state before the findings were submitted to the Legislature.

I think, on the whole, it is better not to hurry legislation. When definite and widespread changes are being attempted in a system of taxation, things must have a period of gestation, like

We found that New York State had a great mass of exemptions from taxation. In real property from one-fifth to one-quarter had been exempted. There were also radical different methods of taxation. There was a general line of development, which included general property, personal property, and other forms for individuals and institutions that could not be reached under the old general property tax. Then there were great inequalities. Thus we had one net profits tax in our state, the tax on manufacturing corporations, which is 4.5 per cent, and includes financial institutions, public utilities, etc. In the case of banks, the national banks pay 6.8 per cent, the state banks 6.58, trust companies 7.33, investment companies 3.13, and in the class of the public utilities are the following rates: Steam railways 27, electric railways 44, telephone and telegraph 16, gas and electric 23. The utilities included were only those operating at a profit.†

So much for the inequalities. Now as to the methods and number of taxes, I will quote the facts on several utilities:

Steam railroads

1. Steam railroads:
(a) General franchise tax (article 9, section 182, Tax Law). (Franchise tax is based upon the capital stock of the corporation. Tax rate variable, depending upon dividend rate, relation of assets to liabilities, and average price of stock sold.)
(b) Additional Franchise Tax (article 9, section 184, Tax Law). One-half of 1 per cent on gross intrastate earnings not including earnings derived from business of an interstate character.
(c) Special Franchise Tax (article 2, sections 44-49, Tax Law). (Tax Commission annually determines valuation of special franchises subject to assessment in each city, town or village. Final equalized valuation is the assessed valuation on which all taxes based upon special franchise are levied by local authorities. Tangible property situated upon streets, highways, public places or public waters in connection with the special franchise is taxed with such franchise).
(d) General Property Tax. (Real and personal property, excluding that which is

a public utility cannot do this very well. In the days of smaller things, when

^{*}Abstract of address presented at mid-year meeting of the American Electric Rail-way Association, Washington D. C., Feb. 16, 1923. †For further particulars of this report see ELECTRIC RAILWAY JOURNAL, Feb. 4, 1922 pages 186-188.—EDS. the human embryo, before they get to a point where they are ready to be born.

assessed with special franchises, is taxed under this head)

assessed with a substantial with the stand and the substantial and the substantial transfer and the substantial and the substa

hlecuted or surface railroads not operand the steam (a) Franchise Tax (article 9, section 185)

185)

I per cent on gross earnings from all sources within the Stale, 3 per cent upon amount of dividends declared or pald in excess of 1 per cent upon actual amount of poid up capital.

(b) Special Franchise Tax (article 2 sections 14 19 Tax 1.5w).

(Same as steam railroads)

(c) General Property Tax (Same as steam railroads). Then the following missessions steam railroads in sections of the period of the sections of the sections of the sections.

steam railroads). Then the following mis cellaneous provisions were made: \$ lither transportation con-prines (laxed upon same basis as steam railroads.) \$ Waterworks companies gos companies electric or steam heating, lighting and

ter computies.
(a) Franchise Tax (article 9, section

One-half of one per cent on gross earnings from all sources within the State.

Three per cent upon amount of dividends declared or paid in excess of 4 per cent upon actual amount of paid-up capital.

(b) Special Franchise Tax tarticle 2, sections 48-49. Tax Law, same as for steam railroads.

rallroads).

m). General Property Tax (same as s(cam railroads).

ELECTRIC ROADS TAXED MOST HEAVILY

Not only are electric roads, for example, taxed as you notice, far more heavily than the gas companies, but there is a great deal of difference in the possibility of shifting their taxes to their customers, as between most gas companies and the electric roads where the fare is fixed by franchise. The gas companies generally have the opportunity to shift their burden through higher rates, but there is no such a chance with the electric railway, which has its fare fixed. Then, of course, the question arises, whether it is fair to shift into a body of consumers an unequal share of the tax burden. We had to report, in the case of this investigation, that our method of taxation was an arbitrary, uncertain, intricate, meticulous hodge podge. We found that the inequalities were scandalous and that they constituted disgraceful discrimination.

A REASON FOR SOME OF THESE Provisions

There was a reason for some of these intricacies. New York State originally had a tax on the capital stock of utility companies, but the bonded indebtedness was deductible from the value of capital stock. But as many companies issued large numbers of bonds, certain classes including elevated and surface railways, were withdrawn from this tax and subjected to a 1 per cent gross earnings tax, plus a tax of 3 per cent on dividends in excess of 4 per cent upon the actual amount of paid-up capital.

Light, water, gas, heating and power companies were also withdrawn and taxed in the same manner as the street railways except that the rate of gross earnings was made 0.5 per cent. There was no apparent reason for the difference.

in 1899 the Roosevelt administration in New York State put a special franchise tax into effect to prevent evasion. The language used in connection with that Act was as follows:

"Value of all franchises, rights,

authority, or permission to construct, maintain and operate, in, under, above, upon, or through, any streets, highways or public places, any mains, pipes, tanks, conduits or wires, with their appurtenances, for conducting water, steam, heat, light, power, gas, oil or other substance, or electricity for telegraphic, telephonic or other purposes" was declared to be real estate for the purposes of taxation assessable by the State Tax Commission for state and local purposes.

These special franchises had often escaped taxation prior to this, since, as personality, any indebtedness could be deducted from their value. This was an important step in advance. There has been, however, much difficulty in defining the special franchise, and the operation of the law has been greatly hindered in consequence. equalization of special franchises and other real estate was permitted until 1911, and the more efficient central assessment led to discrimination against the possessors of franchises. Much litigation ensued, and half of the taxes imposed between 1899 and 1911 remained unpaid at the end of that period. There has been less trouble since the amendment.

There was a good deal of discrimination against the possessors of franchises as compared with the way in which ordinary real property in those locations was assessed, because the ordinary property was assessed far below the value, and in 1911 there was a clause added to the Act, for the purpose largely of clearing up ambiguities in interpretation of the earlier law, and the corporations were reclassified in 1906 for the purpose of the capital stock tax.

OBJECTIONS TO FRANCHISE TAXATION

I will call your attention next to the fundamental defects of methods like those which I have described, in the case of public utility taxation, as they have appeared to us. In the first place, the lack of certainty in such methods, especially such taxes as special franchise tax, to which I have just referred, wou'd cause a great deal of confusion.

There is no entirely satisfactory way I know of to determine the processes by which to value a special franchise.

This lack of certainty, especially in the special franchise element, has, as I have said, caused a great deal of trouble, and there is no entirely satisfactory way of determining the precise value of special franchises to use the public highways. All such determination necessarily involves a large measure of personal judgment, and this is a difficulty recognized by the Tax Commission of New York in its method of determining intangible franchise values which is adopted in accordance with the so-called net earnings rule as prescribed by the courts, that is by capitalizing the profits of the corporation in excess of a certain rate upon the value of the investment, in calling that the intangible value of the franchise. That is a practical way out of the difficulty, but still arbitrary, because of the un-

certainty of factors involved-the value of the investment, for example, and the rate of interest to be employed.

So with the tangible part of the special franchise. How are tracks, wires, po.es, conduits of the public utility corporation to be valued? What is the proper basis of valuation, cost, replacement value, with or without depreciation, or what? And when the method of valuing is determined upon, the separate valuation of the tangible part of the special franchise as a basis of taxation involves serious uncertainty. What value has it anyway, except as a part of the whole equipment of the corporation as a going concern?

In 1919 the State Tax Commission of New York, in view of the abnormal conditions of the preceding three years, averaged a period of five years in the attempt to produce fair valuations, There is nothing very certain about a value which has to be obtained after

this fashion.

EXPENSES OF TAX COLLECTION

There is, of course, a dead loss to the State in all excessive costs of collecting and administering taxes. There is dead loss to the taxpayer in complying with complicated tax laws. The labor of keeping special accounts, of filling out complicated forms, of getting doubtful points decided in the interpretation of the facts or of the law. the expense of contesting assessments. necessitates an expenditure for clerical force, accountants, tax experts and attorneys which is a very serious burden to many corporations. The whole thing is wrong.

REMEDIES SUGGESTED

I will say a word now about the recommendations we make in our report to the Legislature in the State of New York as bearing on the whole problem. We want to wipe out the special franchise tax entirely, and wipe out the tax on the tangible personalty. The value of such property has little relation to the ability of the corporations to pay taxes. With the adoption of a sound basis, the necessity of any tax upon personal property will disappear.

As to the tax on real estate-there should be left to the localities the income from the tax on the real estate of public utilities, closely defined. The definition of real estate has been broadened to include classes of property of public utility corporations which are really personal property. All real estate is planned to be assessed by some central authority or else by an advisory authority.

In our new plan we take the position that a public utility corporation pays more than its share. Conditions surrounding public utilities have changed very radically since the beginning of the twentieth century. The trouble is, however, that public opinion is still based largely on the assumption that the old conditions still obtain which were, at the time, as we all know, loose, unregulated and often deplorable, but that is the condition of public opinion which you have to face in settling this matter.

The whole question of public utility taxation should now be reconsidered in the light of the changed conditions with respect to the public control of rates of charge. The State has been using public utilities as tax collectors, imposing upon them obligations justifiable only upon the assumption that the extra burden can be passed on in higher charges to certain particular sections of the consuming public. Some can pass it on and some cannot. Even in the case of those which can pass it on, the question arises as to the equity of hitting certain large bodies of consumers unfairly or even laying taxes in proportion to the use of public utilities at all.

There is a good deal of reason for the opinion that public utility taxes will play a relatively small part in the future of tax systems in case the present system of regulated rates proves to be effective and is continued. Under public control of rates, the true function of a public utility tax should be so designated that in cases where several companies operate under the same controlled rate, more tax would come to the State from the profits of companies which are more favorably circumstanced, therefore able to earn more than a fair return. There is probably a necessary inexactness of the rate-fixing process, and taxation can help out this inexactness when it works out more than fair profits for certain companies.

Public utilities have always properly been taxed on their local real estate, narrowly defined, as a reimbursement to the locality for services rendered, like

protection of the property.

An additional tax is levied on net income, defined so as to permit the deduction of a sum equal to a fair return upon all the money invested, whether borrowed or not. So in this case there is a tax on real property, narrowly defined, and a tax on what might be called pure economic profit. If the whole system of taxing public utilities can be reduced to these two ways, we are getting somewhere and will be on a really sound basis.

There has been an alternative suggestion, and that is a gross or net tax, on the ground that the state must have a regular income. Is the support of the state to be limited to those corporations that make profits? All real estate The owners have paid a real tax. farmers have to pay these taxes in lean years just as well as in fat years. The government must function in years when business is poor as well as in years when business is good. The practical phase in New York has led to the suggestion of an alternative gross or net tax which will replace the present series of state taxes.

TAXES IN OTHER STATES

Just a word about the tax conditions in other states. The report shows quite a medley. There is the ad valorem property basis; secondly, the capitalization basis, and thirdly, the earnings basis.

The ad valorem basis is difficult and expensive, requires a large staff of experts familiar with the details of the

business of corporations involved, and personal judgment enters to a large degree. There are also many serious questions as to the valuation of physical property. Again, physical value alone is not a true measure of a corporation's worth nor of the taxes it should pay. The thing that gives worth to a corporation really is its earning power. The earnings tax is simple and clear, and the consensus of public opinion in the country seems to be in favor of taxes upon incomes or earnings and the rapid development of such taxes. California, Minnesota and Connecticut have led the way.

I might, in addition, advise you not to try to force through any legislation by more or less clandestine, undesirable means-great harm has been done by such a method in the past, and I have never seen a business group try that way of securing legislation that didn't get the worst of it. What are required, chiefly, are facts, time, and conciliation. Bring forth the figures of New York State, or some other place, and have these figures so verified and substantiated that you know exactly where you are, and then you can have a real, fundamental drive upon intelligent public opinion.

Taxation and Regulation*

The Virginia State Corporation Commission Regulates Rates and Assesses Property for Taxation—Comparison of Tax Increase by Years—Tax on Earnings Discussed

By ALEXANDER FORWARD

Member State Corporation Commission
of Virginia

N VIRGINIA in 1921 the electric railways paid in taxes 36.6 per cent of their total net revenue. In 1917 they paid 13.61 per cent of their net revenues in taxes.

Most of the electric railways in the Virginia cities and some of the companies operating interurban and summer resort lines are also in the light and power business, and two or three are in the gas business. The e'ectric railway companies paid in 1917 in taxes on their light, power and gas properties 4.65 per cent of their net revenue, which had increased in 1921 to 6.97 per cent. The percentage of taxes to net revenue advanced 50 per cent in the five-year period on light, power and gas operations, while on electric railway operations it advanced 269 per cent. The effect of the heavy relative increase in railway taxes is reflected in the total company taxes of those corporations doing allied business, so that these company taxes increased from 8.9 per cent of net revenues in 1907 to 16.12 in 1921.

No federal taxes are included in any of these figures, and it is evident that should they be taken into account the percentage of tax to net revenue of electric railways in Virginia would not be less than 40 per cent.

Now the sum of electric railway taxes has not increased to an alarming extent. We have had marked advances in the state tax rate, and that fact, with larger collections from franchise taxes on gross receipts due to higher fares in many instances, accounts for the increase in total taxes. The trouble is not with heavier taxes but with lessened net revenue, which was 40 per cent less on Virginia electric railways in 1922 than in 1917. The causes are, of course, easily discernible-higher operating expenses with rapid increases in the use of both privately owned and publicly operated motor vehicles.

Taxes, therefore, constitute only one

*Abstract of d'scussion presented at midyear meeting of American Electric Rallway Association, Washington, D. C., Feb. 16. 1923.

of the problems of the electric railway today, and so far as Virginia is concerned, they are a minor problem. It is, however, evident that a system of taxation that consumes 36.6 per cent of net revenue plus federal levies cannot be defended.

lt is quite true, as Senator Davenport suggests, that under regulation the public utility acts as a tax collector. rates must be made sufficient to meet the taxes as an operating expense, so that the heavier the taxes the heavier the burden not on the utility but on the consumer of its service. There is much that appears in his plan for a tax on earnings to supplant a tax on property, especially if it can be devised so that the more profitable companies will pay the larger percentage of taxes on earnings. The Virginia State Corporation Commission is possibly the only regulatory commission in the country which also assesses the property of all public service corporations for taxation, state and local. We fix the value, and the General Assembly decides the rate to be applied for the State, and local bodies fix it for the several communities. Our constitution has certain requirements as to assessment which preclude any change in the system unless and until the fundamental instrument is changed.

There are difficulties in any method. A tax on gross earnings alone will not make for equality. In Virginia the electric railway with the largest gross earnings is by no means in the best position to pay, for its statements show deficits in its railway operations. We have that sort of tax now supplemental to the property tax, and I have shown you the results. A tax on net earnings would sharpen the knife of regulation. The public has a sort of suspicion that corporations and individuals are now sometimes engaged in finding means of increasing their expenses to lessen the sum of their federal income taxes, and this sort of suspicion might easily be directed to State and local levies determined in the same manner.

How Should Railways Be Taxed?*

An Explanation as to How a Disproportionate Burden Is Now Placed on Electric Railways as a Result of Piling One Tax on Another

> By Alfred T. Davison General Counsel Third Avenue Hallway, New York, N. Y.

fundamentally necessary. and means of raising taxes has been handled in the past as a political question rather than a scientific, economic question, with the result that we find the tendency in the past has been to impose the tax indirectly upon people rather than directly. Thus we find the public utilities burdened with taxes in various forms imposed upon them with the idea that such utilities would act as tax collectors in that the tax would be passed on by such utilities to the users of the utility by the fixing of rates of fare or charges sufficiently large to include such taxes, or by reducing expenses by reducing service.

The disproportionate burden which as the result of piling one tax on another is now placed upon street railway companies-in common with, but more than, other utilities-is explained by the history of the industry. In the beginning, when the operation of street railways was unrestricted, high burdens by way of taxation were also imposed as a means whereby the state could participate in assumed huge prospective profits. The next step prospective profits. came when the so-called special franchise taxes were imposed as a means of giving to the municipalities a method of reaching intangible property, on the theory that the intangible property, to wit, the franchise, was producing large revenues to the private owners, and that part of this should come to the municipalities.

During all this time, however, the street rallways, being unregulated especially as to service, could, and actually did, pass on these taxes to the ear rider. They were in reality tax gatherers. Now we are under a system of state regulation by which rates are limited to the cost of service and the amount of service itself is under the direct control of the state. With this radical change, however, there has been no compensating change in taxation. Thus the inequality and disproportion in taxation of public utilities has come about. Whereas before state regulation the utilities could unquestionably pass on the tax to the consumer, now if earnings are not sufficient to pay the tax and the return on the investment the public utilities cannot pass on the tax and therefore are not tax collectors, but must themselves pay the tax, regardless of whether the earnings are sufficient to pay a fair return on the property. In other words, the tax must be paid and the investor gets what is left. The important point

O LONG as governments exist the is that the inability to pass on the tax imposition of taxes is, of course, is due to the drastic regulation by the fundamentally necessary. The ways and means of raising taxes has been service or in reducing rates.

Senator Davenport mentioned the difficulties of using street railways as tax gatherers. Because this proposition forms the basis of later deductions which I shall suggest, let me give a few reasons why street railways, as distinguished from public utilities generally, cannot be used as tax gatherers.

For a public utility to be used as a tax collector, the rates charged consumers must be susceptible of increases to cover all operating expenses and taxes and a return on the property invested. This is feasible with public utilities generally. It is not possible in the street railway business.

In the first place, carfares are not susceptible of changes from time to time. It is only under the stress of extraordinary circumstances when increases in fares are tolerated. In the larger cities the American public has been educated on the basis of a 5-cent fare, and atreet railways have been able to obtain increases in certain parts of the country only as a result of war conditions. The public certainly would not tolerate variations in the rate of fare to cover merely taxation.

INVESTOR FREQUENTLY PENALIZED

In the second place, in all utilities outside of street railways the rates charged the consumer are susceptible of change to cover variations in operating expenses, including taxes. For example, a gas company charging \$1 or \$1.25 per thousand cubic feet can by increasing its rate 1 cent, which means less than 1 per cent of the entire rate. obtain sufficient revenue to cover its taxes. This is not true in the case of a street railway company, where the increase of 1 cent, which is the lowest increase there can possibly be, means an increase of 20 per cent in the rate of fare.

Since, therefore, street railways cannot pass on the tax to the street car rider, one of two results must follow—where street railways are not earning a fair return on the capital invested, the investor is paying the tax; to the extent that he loses a fair return on his investment, because of the imposition of the tax, the investor is in reality paying the tax.

Nor is that all. If the street railway company is not making any return on its capital, this tax is taken out of the investor's principal. This result must necessarily follow where operating revenues do not meet operating expenses. If the business is to continue, taxes must be paid first. Other expenses must be cut or postponed. Naturally the first expense which is postponed or eliminated is the expense of keeping the property in good condition. The deterioration thus resulting actually lessens the value of the property in which the investor has put his money. Thus, to the extent that the payment of taxes imposed upon the public utility has brought this about, just to that extent has the payment of this tax come out of the principal of the investor. On the other hand, in the case of a street railway which in addition to paying the taxes is earning sufficient to pay a fair return on its property, the tax is in reality an income tax.

Aside from the fact that the passenger in the first case does not pay the tax, and in the second case is paying the tax, the further inequality is apparent. In the one case the tax is a hardship and a penalty, and in the other it is not. The street railway which cannot afford to pay it must pay it; the street railway which can easily afford to pay it is not paying it, but the passenger is paying it.

Senator Davenport stated, and it is indeed the unanimous verdict of all who have investigated the subject, that any tax imposed on a street railway company should be on the basis of income. Likewise all agree that an ad valorem tax has no place in a scientific system of utility taxation. The question is, what income of a street railway shall be taxed? I believe that the only tax which should be imposed on a street railway is a tax on its net income over and above a fair return on the capital invested or the value of the property in public service.

I believe that those who advocate a tax on gross revenues have failed to appreciate that gross revenues of a street railway company or any other business are in no sense earnings or in-The fundamental reason why an ad valorem tax on public utilities is abandoned is because earning power is the criterion or atandard of its value. The gross revenues of a public utility have no relation whatever to its ability to earn and its ability to pay a tax. Many companies having large gross revenues have no net income whatever and many companies having small gross revenues have a large net income. Therefore, the very reason for advocating the income tax or a tax on earnings has no relation or application whatever to the gross revenues. An income tax is recognized as one of the fairest methods of taxation yet devised, and yet all income tax systems are based on net income and not on gross. A tax on gross income as applied to a public utility may result in more injustice and inequality than an ad valorem tax on its property. As applied to a street railway company the result often is that the greater the numbers of the public who are transported on its cars the greater the tax it is required to pay, regardless of its ability to pay.

State regulation of rates and service has had a far-reaching effect on taxa-

^{*}Abstract of address presented at midrear meeting of the American Electric Ballway Association Washington D. C., Feb. 14, 1221

tion of street railways. The theory under which state regulatory bodies are created is that rates and service are so regulated that the investors, who are in reality the owners, of street railways receive only a fair return on the investment or the value of the property in public service. Thus it is fundamentally established that street railways cannot, like ordinary business, make any profit above a fair return on the money invested. In other words, street railways, while privately owned, are publicly managed and the situation of the investors, who are the actual owners of the property, is no different from the investors in municipal bonds, the proceeds of which are used to construct a municipally owned and operated street railway. For the same reason that no one would ever advocate taxing municipal bonds, the proceeds of which are used for the construction of a municipally owned and operated street railway, the investors in the privately owned but publicly managed and operated street railways of today, who can make no profit on their investment, should not be taxed. Nevertheless, under our present system of taxation, as the result of state regulation of rates and service, this is exactly what is happening.

It, therefore, follows that the only tax which should be imposed on a street railway is a tax on its net income over and above a fair return on the capital invested, or the value of the property in public service. Another way of putting this is, the investor should first get a fair return on his investment and then what is left may be taxed. The investor in public utilities should be treated no differently than the investor in municipal bonds, the proceeds of which are used to construct a municipally owned and operated street railway.

Such a tax as is here proposed, namely, a tax on the net income over and above a fair return, would work in absolute harmony with rate and service regulations. If the utility is so regulated that the investor receives no more than a fair return upon his investment, then he is really in the class with the holder of a municipal bond, and should not pay any tax merely because he has happened to choose street railways as his form of investment, for the reason that he is making no profit and the utility is performing a public service without profit to any individual.

If, on the other hand, the public utility is so regulated with respect to its rates and service that the investor receives more than a fair return on his investment, then such investor is not in the class with the owner of municipal bonds, and will be required to pay a tax upon his earnings over a fair return, for the reason that while the utility is performing a public service, it is also affording to the extent just mentioned a profit to an individual.

It is time to realize that if we are to have state regulation of rates and service on the theory that utilities are public corporations, then our system of taxation must be based on the same principle. In other words, utilities should not be regulated on the theory that they are public corporations and taxed on the theory that they are private corporations.

If taxes are to be based on income rather than capital, on earning power rather than realized wealth, and if ability and not possession is to be the measure of the tax, then net income over and above a fair return on the capital invested is the only scientific basis.

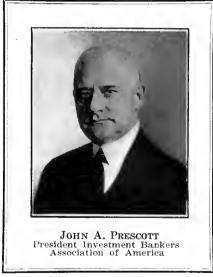
The tax on net income over and above a fair return should be in lieu of all other taxes and charges whatever, whether fixed by statute or imposed by franchise obligations. This also includes paving charges.

The argument has been made that because franchise obligations are in the nature of a contract as between municipalities and the street railway corporations, any change made in the legislature would impair or interfere with the obligations of such contract. The United States Supreme Court, however, has upheld the authority of the state to alter the obligations contained in franchises granted by municipalities and accepted by the street railway companies. I refer to the decisions of the United States Supreme Court in City of Chicago vs. Chicago Railway and others, 257 U. S.; Worcester vs. Street Railway, 196 U. S., 539, and the cases there cited, and City of Pawhuska vs. Pawhuska Light & Gas Company, 250 U.S., 394.

Community Interest Between Railways and Bankers' Association*

Electric Railways Should Lose No Opportunity to Broaden the Viewpoint of Public Officials and to Broaden the Knowledge of the Public Itself

> By John Adams Prescott President Investment Bankers Association of America



THE investment bankers are very proud of some of the investments they have handled in electric railways and not so proud of others. It appears, however, that the latter feeling reflects the great changes in conditions that have taken place rather than the poor judgment in making these investments. In discussing the address by Senator Davenport I wish to speak particularly of the effect of federal taxation upon electric railway financing. The cost of new capital to electric railways has been increased at least 2 per cent because rich men can no longer afford to invest in public utilities. The high surtaxes force them to invest in taxexempt securities. Hence the supply of new capital must now come from

*Abstract of discussion presented at midyear meeting of American Electric Railway Association, Washington, D. C., Feb. 16, 1923.

small investors and customer ownership plans. To give employment to soldiers returned from France, great impetus was given to the issuance of state and municipal tax-exempt bonds in order to do great public work. The effect of this is now beginning to be realized, as it has meant great increases in taxation to everyone and particularly the utilities. The most notable effect has probably been upon the interurban railways. It seems an irony that these roads, which have served the public well for many years and paid their share of the burden of government, should now be taxed to furnish facilities for unregulated and untaxed competitive transportation in the form of buses and trucks. The public is awakening to this situation as is indicated by the agitation for a constitutional amendment prohibiting tax-exempt securities and by the introduction of bills in state legislatures that would tax and regulate users of the highways. The growth of taxes has so cut down the margin of earnings over tax requirements that this has added to the lack of confidence in railway securities created by the public agitation against the railways.

To meet this situation men of the industry should lose no opportunity to broaden the viewpoint of public officials. Of even greater importance is the need to broaden the knowledge which the public itself has of this situation. I urge the advisability of the heads of railways appearing personally at luncheons and other gatherings to speak, rather than to send a representative, so that people can see that these men have no horns and are very human and ready to meet the public face to

face.

Country Past the Peak

Vice-President Coolidge in an Address at the Convention Declares Business, Including Electric Railway Industry, Is Returning from a Time of Depression to One of Prosperity,

He Congratulated the Delegates at Washington Upon This Condition and
the Opportunity Thereby Afforded to Give Better Service

VICE-PRESIDENT CALVIN COOLIDGE, in an address at the midyear meeting of the American Electric Railway Association on Friday morning, said:

"Mr. President, members of the Association: Some of my numerous friends who belong to your association extended to me an invitation to come here to give you, at least, my greetings.

"You have been working under the difficulties for the past few years that every regulated enterprise has felt.

"It is notorious that the action of the government follows and does not precede the development of business conditions; and while you saw an everincreasing cost of operation, your ability to secure increasing returns, in very many instances being dependent on the action of some governmental body, hardly kept up with the requirements that you felt.

"I am sure that you, in common with all the rest of the nation, are glad to see a time when you are returning to a sound and substantial basis of operations—when you can look into the future with some degree of being able to tell what the future holds, what your costs are going to be, and what plans you can make for development and for furnishing the necessary service to your patrons.

"The electrical development of the nation in the last twoscore years has been perhaps its most wonderful development. Without it, it would not be possible at the present time to enrry on the business of the nation as it is carried on, either for the transmission of intelligence or in the transportation of merchandise and of the people. It is a program that is not yet solved, one on which the very best of brains and financial ability of the nation are still working, and I have confidence that the problems that are undertaken by those who represent our country in those fields will ultimately be worked out to the satisfaction of our people



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Calvin Coolidge

Vice-President of the United States

"You are dependent very much on the action of the local and the national governments. I think you have recognized a desire, both of the localities which you serve and of the nation, to co-operate with you, to support you, and to help you work out those problems the solution of which would give you the ability better to serve your patrons.

"One of the chief causes of the great increase in costs, of course, it goes without saying, has been the excessive public expenditures that our country, in common with most of the other countries of the world, have been compelled to make during the past few years. Even in a great and rich country like America, you cannot raise and expend more than \$60,000,000,000,000 in the short space of time in which we have done that without putting a very excessive strain on the whole financial fabric of our nation.

"But we have met that strain better and easier than any other country on earth has met similar strains from these excessive expenditures. We have passed the peak and are working back now toward the time of stability. We have paid off something more than oneseventh of our national debt, reducing it from \$26,000,000,000 plus down to \$22,000,000,000 plus. We have reduced our great burden of taxation, not to its minimum—that depends on the expenditures that are being made from year to year—but we are reducing these steadily and consistently as fast as they can be reduced and maintain the necessary efficiency in the public service.

"You are feeling the results of that in your business, as all the people are feeling it in their business, and we are returning from a time of depression to a time of prosperity, a time when the carloadings of trade are reaching almost their highest point, a time when the consumption of the great basic materials and their production, whether it be of iron and steel, copper or cotton — any of those prime necessities that go into the business life of the nation — show by their statistical position that our country is in an era of bounding prosperity.

"That has been brought about by the co-operation that has existed between the business enterprises of the country and the government of the country. This is going to do a great deal to solve those pressing problems that have come to every business enterprise in the land. It is going to bring more nearly together the expenses of operation and the returns from income, so that the margin which has heretofore been on the wrong side of the ledger is being steadily transferred to the right side of the ledger.

"I want to congratulate you on the great service which your operation is rendering to the country; on the prospect of the returning prosperity and on the hope and the confidence that on your ability to serve America, you are going to make it great and powerful, acting with the other great interests of the country, making it a land able to take care of its people at home and able to render such a service as it finds necessary to the other people of the earth."

Industry Coming to Better Days*

Meeting at Washington Calls to Mind Value of Work of Federal Electric Railways Commission—Important Problems of Industry Reviewed by Association President in Banquet Address

By C. D. Emmons

President United Railways & Electric Company of Baltimore
President American Electric Railway Association

THE meetings today have been interesting and most profitable, and I know that you will enjoy the program for this evening. May I take this opportunity of acknowledging publicly the hard work and many courtesies extended by the Capital Traction Company, the Washington Railway & Electric Company and the Washington-Virginia Railway, for without their assistance and whole-hearted co-operation we could not have had the successful meeting which we have enjoyed.

It is fitting as we assemble here in the capital of our country to pause for a few moments to express our appreciation to the federal government for its constructive assistance to our in-

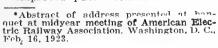
dustry.

In May, 1919, the then Secretary of Commerce and the then Secretary of Labor, together with the National Association of Public Utility Commissioners, the Governors of many states, and the Mayors of many cities, joined in a request to the President to authorize a commission to study the electric railway situation. As a result the Federal Electric Railways Commission was organized, consisting of representatives of the various departments of the government, the banking interests of the country, the municipalities and the employees and management of the industry itself. Before promulgating its report, this commission spent more than a year in painstaking work, calling many expert witnesses to its aid. This report pointed out plainly the joint obligations of the managements and the public to bring the industry back to a healthy state. It gave courage to managements to wage their present battle to restore the industry to its proper place of service to the public, confidence to its investors and peace and comfort to its employees.

Tonight, we feel that we can at least make a good progress report-that we are waging a winning fight and keeping faith with the government itself.

The industry is in better condition than it has been at any time since the European war, and if the public-including our state and city officials, will continue to adhere to the principles set forth by the Federal Electric Railways Commission as zealously as the greater part of the industry is trying to carry them out, the electric railway problem will be solved.

Improved public relations and con-





C. D. EMMONS President American Electric Railway Association

ditions in general invariably have followed frank dealings with the public and the public officials. Frankness has become widespread; three hundred companies today are telling their story by advertising through the newspapers, car signs, booklets and speakers; whereas, when the commission made its report very few companies were taking the public into their confidence.

That the managements themselves have effected striking operating economies is shown by the fact that in the commission's report issued in 1920 of a group of twenty-one city and interurban companies, the operating ratiothat is, percentage of operating cost to revenue, was 78.4 per cent. The operating ratio for the year just closed for a similar group of railways, with gross operating revenues remaining practically constant, was 72.4 per cent, a decrease of 7.6 per cent.

This reduction in operating ratio has been brought about almost entirely by a reduction which has been effected in operating expenses through the following means:

- 1. Use of the one-man car.
- 2. Use of trail cars and lighter weight cars.
- 3. In some instances, the abandonment of unprofitable lines.
- 4. Through improved routing and rearranging of schedules.

5. Through the use of labor-saving devices.

6. Through the more economical use of labor generally.

With economies has come improved service. The money that was spent for operating cars on little used lines is being put into increased service on the lines where service heretofore was inadequate.

The tax burdens of the street railways are almost as numerous as Heinz's famous fifty-seven varieties. A record of five companies taken for study in this connection recently shows a total of thirty-seven different kinds of taxes. Many of these special taxes are unjust and unfair, and in so far as they benefit the entire public alike (and I might say in many cases they are of greater benefit to the automobile riders or non-patrons of the street car than to the car riders themselves). they certainly should be eliminated. The fact is often lost sight of that all tax burdens, special or otherwise, placed upon the street railway company must in the end be reflected in the cost of rides to the street car patrons.

The destructive competition by jitney buses or motor buses as common carriers is becoming less acute, for the reason that in the last several years there has been an unquestioned demonstration of the fact that, in order to obtain the best service for any community, unrestricted competition between electric cars and jitneys or motor buses cannot exist. In some cities, buses are now only permitted to run under proper regulations and must first obtain a permit of convenience and necessity from the regulatory bodies. Gradually they are being required to pay their fair share of taxes and to carry a bond for the faithful performance of service and for accident liability. In many communities, electric railways are voluntarily supplementing their service with buses, and the authorities, recognizing the advantages of a single dependable transportation system, are protecting the companies against unfair competition.

No street railway company that is at all progressive can avoid the expenditure of large sums of money each year in extension of tracks, adding to the equipment of power house and substations, adding to the car equipment, etc., in order to give proper service to the public. Without a fair margin over all operating expenses and fixed charges, money for such extensions cannot be obtained.

The ancient cry of a 5-cent fare, regardless of cost, is uttered now only by a few demagogs, generally by those desirous of obtaining personal advertisement by this form of a supposed popular movement. Practically every one of them knows his plan is economically unsound. Scrious-minded, constructive citizens, realizing that fares must vary with differing conditions, are demanding a fare which will be reasonable and just, not only to the car rider himself, but to the company, whether it be 5 cents, 10 cents or something else. They want good service and realize they must pay an adequate fare to get it.

It is futile to expect the threadbare cry for the 5-cent fare ever to die, but persons with the slightest knowledge of economics realize it is as unjust as would be a demand for the return of the 25-cent meal, the \$2 shoe, the 5-cent movie or a good 5-cent cigar.

MUNICIPAL OWNERSHIP TRIALS UNSATISFACTORY

The wisdom of the Federal Electric Railways Commission's declaration that the time is not ripe for municipal operation seems to be borne out by the outstanding present-day experiments in Seattle, Detroit and San Francisco.

Seattle's municipal experiment thus far has been a marked failure, accompanled by high fares and continued accumulated deficits. The last available official statement for the years 1919, 1920 and 1921 shows an accumulated deficit of \$1,526,869. Recently the Seattle City Council in an effort to Increase the earnings of the lines voted to reduce the fare to 5 cents with a 2cent cash or 11-cent token charge for a transfer, in the vain hope that many additional passengers would be attracted. This was done in the face of a report from George F. Russell, superintendent of public utilities, that such a plan probably would mean a net monthly operating loss of \$129.227, a loss of \$1,550,700 per year. Constant efforts have been made by persons interested in decreasing the car fare to take the deficit out of the general tax fund of the city, but this has been successfully resisted by the taxpayers.

Even under such a capable and practically non-political management as that of Senator Couzens, the Detroit system has been unable to reduce fares under those charged by its former private managements and has had to appeal to the people for \$5,000,000 for which to make improvements. This was voted down by a large majority.

Notwithstanding the favorable conditions under which the Detroit property was purchased and is being operated, the city lines still have the same rate of fare as charged by the former or privately owned company

Some of the factors which ought to enable this municipally operated road to grant a lower fare are as follows:

1. Through greatly reduced fixed charges, because the company was forced to sell its city lines for \$22,250,000, which was actually \$9,250,000 less than was offered for the same prop-

erty in 1919. Capitalized even at 5 per cent, this would show a saving of \$462,-500 per year

2. Through the possible assistance of all city machinery and departments in the operation of the road.

3. Through the gradual elimination of jitney competition, which was not restricted but rather encouraged during private operation.

4. Through the extensive use of the one-man cars under city operation, which cars the city itself did not permit private management to operate.

Despite the fact that the San Francisco Municipal Line operates chiefly on the two principal streets of that city, carries only the cream of the traffic and serves little of outlying territory, the official municipal report for the year ended June 30, 1922, shows that when proper allowances for taxes and other imposts charged private companies are made, the line had a deficit of \$190,866 between July 1, 1921, and June 30, 1922. The report also shows that by absolving the municipal line from taxes properly chargeable to it. a "bookkeeping" profit of \$55,669 was made, but everyone knows that bookkeeping cannot pay taxes. Somebody has to pay the taxes which the San Francisco Municipal Line is not paying. It is only fair to state, however, that under this favorable tax plan, the municipal line has accumulated a reserve for depreciation and accidents which is comparable with those set aside by well maintained properties under private management.

Daily evidence of the value of state regulation of electric railways, so in-

dorsed by the Federal Electric Railways Commission, are found on every hand, not only on the part of the street railway companies themselves, but on the part of the public and the car rider. A return to the old order of local regulation would fill managements with uncertainty and immeasurably halt rehabilitation of properties and their return to the condition necessary to give reliable and satisfactory service.

Governor McCray of Indiana says: "The Public Service Commission is a most necessary part of governmental machinery. It has been maligned because it has been misunderstood. The laws governing it may not be perfect, but they can and will be corrected. To abolish this commission would mean the return of political wire pulling and domination of public utilities of every city and town of our state. This would indeed be a step backward and must not be thought of." Sentiments of this character have been expressed by Governors of thirty-seven other states during recent years.

Certainly the electric railway industry cannot be expected to function efficiently and economically if it is compelled to take up the old burden of being subjected to the personal whims and wishes of local politicians instead of scientific regulation by state experts removed from political influence.

The electric railway industry as a whole is striving to do what the Federal Electric Railways Commission and its own experience tells it it is best to do, and the public reaction to that effort makes us confident of the future.

Railways Emerging from Serious Conditions*

Some of the Problems Which Have Confronted the Electric Railway Industry During the Last Few Years Have Been Hard to Solve—State Regulation Has Saved the Industry

> By Thomas N. McCarter President Public Service Railway Newark, N. J.

AS A successful operating proposi-tion, after the early days of experimentation, the electric railway industry is approximately thirty years old. Thirty years is a short period in the cycle of time, but it is a long period to voyage upon a sen of trouble. This particular period of time to which I refer has been, perhaps, the most remarkable period, industrially speaking, in the history of the world. In it machinery, as the great saver of human energy, has been brought to its present high degree of development. Science and Invention have done their greatest work during the span of these years. Many of the great inventions which are now regarded as necessities of life were either altogether unknown at the commencement of this

period or, like the electric railway industry itself, were in their swaddling clothes. In 1893, the use of the telephone was extremely limited in its extent and the telephonic art was amateurish in the extreme as compared with its development of today. internal combustion engine and motor car had not proceeded beyond the brain of the inventor. Now, the motor industry is said to be our largest industry with 12,000,000 cars and trucks upon the streets of this country alone. Mammoth steamships, of a character and size then uncontemplated, now race over the seas. Wireless long distance communication was as yet unknown. The operation of the submarine was confined to the works of Jules Verne: the Wright brothers had not yet made their great discovery, which culminated in the development of the modern aeroplane, and now within the last two years has come radio, with its attend-

^{*}Abstract of address presented at midpear banquet of American Electric Hallway Association Washington, D. C., Feb. 16, 1923

ant wonders. The electrical industry itself, in the matter of generation, transmission and distribution as compared with present-day conditions, was in the infant class. Surely there is no thirty-year period in the history of the world which can in any way match this period of inventive and industrial development.

So, also, there has been simultaneously taking place the world over during this period a sort of social or economic revolution, which is finding expression in different degrees of radicalism-some greater and some lessall over the world, the underlying principle or substratum of which seems to be an attempt toward a greater equalization and distribution of wealth than has ever existed before; a rebound from the period during which enormous fortunes were made as the result of inventive genius or unusual business sagacity; a disposition to control and to limit the activity of the individual for the so-called benefit of the many. Much of this has been greatly exaggerated by the World War, reaching its most extreme realization in the deplorable conditions existing in Russia today. In our own country it has manifested itself through the medium of death taxes, high income taxes, especially surtaxes, and as to railroads and public utilities, through the excessive and misguided application of the principle of regulation.

FOR REGULATION WITHIN BOUNDS

I find no fault with the principle of regulation itself as applied to our industry. It is all right if kept within reasonable bounds. Our industry has both suffered from and benefited by it. It is well to be perfectly frank in considering a question of this momentous character. The very great advantage that has come to this industry from the principle of regulation, as I see it, is this: Most of the franchises of the electric railways of the country, especially in cities, contained fare limitations-generally of the 5-cent variety. These provision were in the nature of contracts that could not have been avoided without the consent of the municipality making them, or by the act of the state, of which the municipality was the creature. Then the principle of regulation became fashionable ten or fifteen years ago, the state enacted statutes creating commissions, with rate-making powers, to fix just and reasonable rates for all public utilities, the effect of which was, in most cases, as the courts have held, to wipe out these old fare limitations contained in the franchises. Had this not been so, great and irremediable disaster would have overtaken the industry in 1918, when overnight, as it were, the costs of operation of the railway systems of the country were doubled, due to conditions created by the war. The relief that commissions were able to give and did give to the companies under the law, as above set forth, saved the industry during the war period and

thereafter. Certainly we must admit that this life-saving relief to the industry came as a result of the application of the doctrine of public utility regulation. To have been forced to deal in this emergency with the political ramifications of municipalities would have been disastrous and, I fear, unavailing. Utilities other than electric railways, generally speaking, have not received this benefit from the development of the regulation idea because, as a rule, the price of their



THOMAS N. MCCARTER
President Public Service Railway

product was not denominated in the bond. These utilities could have met the situation, in the absence of regulation, by legitimate increases in the cost of their product. So, too, it is undoubtedly true that some commissions, by their high character, painstaking effort, and fearless performance of their duty, have stabilized the credit of certain of our properties to their lasting benefit. Unfortunately, however, this has not been the universal practice.

Too often have commissions been guided in their conclusions by political considerations. While under the law the exercise of the power of rate making by the state is a legislative function, it is, nevertheless, one of a quasijudicial variety, a fact too often forgotten by those administering the power through political preferment. Fine spun theories of theoretical doctrinaires have been allowed to prevail over the seasoned experience of hardheaded men. The effort has been to give as little relief as possible, not to meet the situation squarely. The resuit of all this. carried to the nth power, has been a blight upon the railroads and other public utilities of the country, including, to a marked degree, electric railways, during the last fifteen years. Instead of large expenditures to keep pace with the proper development of the nation, the railroad mileage of the country is actually con-

Capital is on strike and will not further participate in such undertakings. Is it any wonder? An effort is now being made in certain

localities to substitute municipal regulation for state regulation of public utilities, under the guise of the fetish of home rule. If this be accomplished, the evils of regulation to which I have alluded will simply be accentuated and the properties thus regulated will be completely submerged in the vortex of politics.

JITNEY AND BUS COMPETITION

In the last few years there has been let loose, from time to time, in varying degrees of intensity, a hybrid character of competition with our industry, known as the "jitney." Now, of course, every industry existing for the public convenience, as our industry does, must take its chances against the development in the future of some form of transportation better suited to the public need. If we are engaged in an industry that has become archaic, we must pay the price. This is the history of our own industry. The old stage gave way to the horse car; the horse car to the cable car, and the cable car to the electric car. Of this we cannot complain. But no one whose judgment is seasoned or entitled to respect upon this subject believes that the jitney bus can ever replace the electric railway industry. Massed surface transportation can still be infinitely better handled in larger units by electric railways.

I do not say that the motor bus has no place in modern transportation. On the contrary, properly to supplement and complement electric railway transportation in line extensions otherwise impractical, in crosstown service, in boulevard service and the like, co-ordinated with railway service, I distinctly believe in it. But the unlimited, indiscriminate, unregulated competition of irresponsible jitneys, paralleling electric railways, upon the same streets, which are not yet developed to their capacity, is a competition of a destructive character that not only paralyzes the opportunity for development of the railway company but, if allowed indefinitely, will cripple, if it does not destroy, the essential service which the public needs. The interests of the public and the company, in the long run, are identical in this matter, and what affects the company adversely will eventually injure the public. It is apparent that the country is beginning to appreciate this situation. Generally speaking, the jitney menace is passed. Unfortunately, this is not the fact upon the property administered by my associates and myself, but sooner or later the experience of the county will be repeated there, too.

I do not wish to be thought unduly pessimistic. I have been endeavoring to state exact facts—and only facts. I see, so far as our industry is concerned, distinct signs of improvement. We are slowly emerging from the serious result to our industry caused by the greatest war in human history. Every person in this room will be affected, economically if in no other way,

by that war until the end of his days. The price our industry had to pay as its share of the war cost was none too much for the results achieved by the triumph of right over the lust for world dominion and power. Everywhere throughout the country the eranings of our properties are slowly but steadily improving. Commissions are beginning to take a more rational view of our problems; deficits are changing into earnings. The improvement is slow but sure and the future is full of promise. As it is with our industry, so I think it is with our coun-

try. in no pharisaical spirit but in deep humility, for the blessings of our country as compared with the nations of the world. Everywhere about us are signs of great activity and coming prosperity. The financial affairs of the nation, under the leadership of the present great Secretary of the Treasury, are showing a marvelous stride of improvement. The agreement with Great Britain for the funding of her debt, upon terms fair to both countries, will sound a stabilizing shot

Meeting here in the nation's which, like the shot at Lexington capital, we have reason to give thanks, nearly one hundred and fifty years ago. will be heard around the world. Let us, therefore, keep courage; let us cense to grieve over the misfortunes of the past, recalling them only as a guide to shape our course toward better things in the future. So far as human foresight can predict with any degree of certainty, the electric railway industry will last and perform a useful service to the public, and, to use a wellknown phrase, will grow better and better in every way day by day as the years go on.

Regulation and Taxation at Midyear Conference

Washington Meeting Was Devoted to Discussion of These Two Subjects, as They Relate to Electric Railway Companies—President Harding Sent a Message and Vice-President Coolidge Addressed the Conference

THE thirteenth midyear conference of the American Electric Railway Association was held yesterday at the Hotel Willard, Washington, D. C. The fact that several committee meetings were held on Thursday added to the number of attendants at the convention. Altogether there were about 600 who registered or were in attendance at the banquet in the evening.

President Emmons opened the morning session at 10 o'clock by announcing that the subject to be considered at that session was regulation. He then introduced as the first speaker Commissioner Dwight N. Lewis, Des Moines, Iowa, chairman Iowa Board of Railroad Commissioners and president National Association of Railway and Utilities Commissioners. Mr. Lewis' address will be found in abstract in another column.

During the presentation of the address of Mr. Lewis, the Vice-President of the United States, Hon. Calvin Coolidge, entered the room and was escorted to the platform by W. H. Sawyer and Charles C. Peirce. He was welcomed by Mr. Emmons and Mr. Lewis and gave a short address which will be found in another column. At the close of this address, Mr. Lewis resumed his speech, with the appropriate recovery of his audience by the remark that a dry bread sandwich is much improved by a tasty filling in the

As Col. Charles Keller, engineer commissioner of the District of Columbia, was unable to be present on account of illness, his message to the convention was read by L. H. Palmer, Haltimore. This was followed by the paper by Commissioner Charles C Elwell of the Connecticut Public Utiltties Commission. These papers appear elsewhere in this issue. Henry L. Doherty was also expected to discuss the address by Mr Lewis, but was unable to be present on account of sickness.

In discussing the suggestions of Commissioner Elwell about maintaining an

open door to the public, Col. A. T. Perkins, St. Louis, told of the interesting manner in which complaints on the electric railway service, as written to the newspapers, are handled in his city. All letters which are sent to the principal newspaper there, making complaint about the street railway service, are set up and then forwarded to Colonel Perkins, who writes an answer which is published in the same issue with the complaint.

PUBLIC MEETINGS WITH GOOD RESULTS

Thomas N. McCarter, Public Service Railway of New Jersey, told of the plan his company had followed the past year of having meetings in various communities over the territory served where three or four members of the operating and executive force would meet with the public. A little entertainment was provided in the form of a company quartet to make the gathering a little less serious. These meetings were attended by employees and a good many laymen. A representative of the company delivered some message and then opened the meeting to questions. He said that these meetings have been very successful in their effect upon public relations.

The plan is to follow these up with a series of luncheons in the various cities. to which 150 or more of the substantial business men of the community will be invited, and by the employment of this method the company officials are afforded an opportunity to show the intentions of the company to give the utmost in service and be friendly about it.

Mr. McCarter took issue with the suggestion of Colonel Keller in regard to his allusion to the tendency of railway companies to submit fantastic claims in determination of property values. Mr. Mct'arter said that the valuation of the property at best is only an attempt to get at the reproduction value and certainly that the preliminary items of expense, such as promotion, cost of money, commissions, and the other intangibles, are as much a part of the value as the rails and ears. He maintained that a railway property does not just grow, that it must be developed, and that the brains used and the risk taken must be compensated, as the result is of such great benefit to the public.

Major Whitman of the Maryland Commission spoke briefly of the trolley bus installation in Baltimore and Baltimore County, as an example of cooperation between public and railway. In this instance, the public put up \$32,000 as a guarantee against loss by the company during the first five years of operation in order to get the extension of transportation service to serve this community.

SENTIMENT GAINING FOR STATE REGULATION

Thomas N. Wheelwright, Richmond, Va., pointed out how the municipalities in the Commonwealth of Virginia are coming to realize the great need of state regulation of the utilities, in order to establish a basis of credit which will enable these companies to go ahead with improvements and extensions. He said that Virginia has no law regulating bus transportation, but that a law is now under consideration which will establish this as a state function. He mentioned also the fact that a new trolley bus line will be established in Petersburg, Va., next month and that similar installations are also being considered in the cities of Portsmouth and Norfolk.

Referring to the manner in which Colonel Perkins has been able to answer complaints in the same issue of the newspapers in which they were published, Mr. Wheelwright said that he has taken an opposite method by reprinting any complimentary editorial appearing in any local newspaper in large display advertisements. He jokingly said that this has had a very stimulating effect on such complimentary comment.

Afternoon Session

The afternoon session was called to order by President Emmons at 2:30 o'clock and he introduced the first speaker, Senator Frederick M. Davenport of New York, who spoke on "Electric Railway Taxation." An abstract of this address will be found elsewhere in this issue. The following speakers were Major Alexander Forward, Alfred T. Davison and John A. Prescott. Abstracts of these addresses appear elsewhere in this issue.

J. Moss Ives of Danbury, Conn., told of his difficulties as a receiver in paying taxes in connection with the operation of a small street railway property. Connecticut has a 3 per cent tax on gross income, and while the company earned enough during the first two years of the receivership to pay operating expenses, during the third and fourth years it had an operating deficit, but in spite of that was assessed \$7,000 taxes each year for the state. Why the state should expect a company to pay taxes when it could not pay coal bills and other operating expenses he could not understand. Thanks to the Birney car and the car trust agreement plan of purchase, he has been able to make operating expenses and pay the car trust notes as they fell due during the past year. But the property has been operated entirely in the interest of the traveling public and no taxes have been

Mr. Ives told the convention that he has framed a bill which would relieve the street railways from the gross income tax and substitute a tax on the net earnings. He declared that he would go before the Legislature next week to urge its adoption. Unless this plan of taxation can be put into effect he could see no hope of getting his property lifted from receivership.

The next speaker was W. H. Maltbie of Baltimore, who said the first thing to consider in taxation is whether the tax could be passed on to the public. When this could be done a different question was raised than where there was a fixed franchise rate. there is a fixed rate, the tax is paid by the stockholders. In the former case it might appear at first sight that a company has no interest in the matter, but this is not so. In the first place, the country is staggering under a burden of taxation, and all forms of indirect taxation such as this tend to cloud the fact that taxes are being raised. Again, many people think the railway company is getting all of the receipts. The first remedial measure is to determine the aggregate of all taxes of a company and pass it to the people as a "bundle." This should be done not only with railways but with all taxes, and the people will take more interest in elections. Again, all taxes are levied either for the public good or for some special service. General taxes should be paid by all and taxes for special service should usually be charged to those directly interested, but there is no good

President Harding's Message

At the beginning of his address at the banquet Secretary of the Interior Fall read the following letter to the convention from the President:

My dear Secretary Fall:

It has been in my mind that vou are to deliver an address to the Convention of the American Electric Railway Association tomorrow evening. Having myself had the pleasure of speaking before this organization three years ago, I have an especially agreeable recollection of its gatherings and its membership. So I am writing to ask if you will be so kind as to convey an expression of my personal remembrances and regards, and to accompany it with the assurance of my continuing interest in the welfare of the great industry which is represented by the convention.

Most sincerely yours,

WARREN G. HARDING



THE PRESIDENT

reason for trying to collect general taxes through high charges for special service and it is economic injustice.

Henry D. Sawyer of Stone & Webster said that in the present methods of street railway accounting paving does not show as a tax and few companies know the aggregate amount of taxes paid by them. He hoped that the new form of taxation to be developed would be simple. The companies also should not have to pay taxes intended to be levied on the investor like the special

mill tax in Pennsylvania and the 2 per cent on bond interest, as this does not lead to simplicity.

Thomas Fitzgerald said that in the new agreement made between the Pittsburgh Railways and the city the company would pay the city \$200,000 annually in lieu of paving charges. This is equivalent to \$800 a mile of track a year. Various imposts like car licenses, etc., formerly aggregating \$175,000 a year have been reduced to \$100,000 a year. These, however, are placed for payment after the return to the company and interest on new money and are payable only if earned.

At the conclusion of the discussion on taxation G. T. Hellmuth, Chicago Elevated Lines, and Victor T. Noonan, Cleveland Railway, made urgent pleas for companies to join the National Safety Council. The meeting then ad-

journed.

The Banquet

WITH a little over 600 delegates present, President Emmons presided over the midyear dinner at the New Willard Hotel, Washington. He took the opportunity to express the particular thanks of the association to the Capital Traction Company, the Washington Railway & Electric Company and the Washington & Virginia Railway for the splendid manner in which they had provided for the entertainment of the guests and the facil-



ALBERT BACON FALL Secretary of the Interior © Underwood & Underwood, N. Y.

President Harding Receives Railway Men

THE President was invited to address the American Electric Railway Association. With all his great tasks pressing upon his time, he was unable to comply, but expressed his desire to receive a small group of the electric railway men assembled in Washington. Accordingly, members of the executive committee and a few others were received by him at the White House at 1 o'clock on Feb. 16. The members of the party were introduced to the President and lingered a few moments while he referred in most friendly manner to the occasion three years ago when as United States Senator he appeared before the midyear convention of the American Electric Railway Association in Cleveland as the principal and much appreciated speaker. Electric railway men in advance of the public at large knew after that address that here was a man competent and worthy some day to fill the high office to which he was shortly thereafter nominated and then elected by a huge vote. They consequently were from that time on his ardent supporters. His words of sympathy and understanding of the serious problems then confronting the electric railways bespoke his great capacity to comprehend industry rights and relations to the public served. The words of advice he uttered then have since been studied, referred to again and again, and put into practice.

The members of the party were: C. D. Emmons, F. R. Coates, R. I. Todd, R. P. Stevens, C. C. Peirce, C. E. Morgan, J. G. Barry, J. N. Shannahan, C. C. Ellwell, H. D. Shute, B. A. Hegeman, J. W. Welsh, L. E. Gould, Labert St. Clair, E. F. Wickwire, H. L. Brown, G. T. Seelv, J. P. Barnes, L. H. Palmer, T. N. McCarter, J. H. Pardee, L. S. Storrs, Carl Beck, L. C. Datz, T. A. Cross and W. E. Cann.

Mr. Harding's address to the midyear convention in 1920 appeared in the issue of the Electric Railway Joennal for Jan. 17, 1920, page 155.

ities for the meeting. He then presented an address which appears elsewhere in this issue.

The next speech, that of the Hon. Albert B. Fall, the Secretary of the Interior, was a plea for good citizenship and for those in attendance to give personal attention to public affairs. Too many business men, he said, who shout in favor of the action of some public official will go to the golf links on election day, leaving those who disapprove of the action of that official to do the voting. The problems of publie life, he continued, are more complex than ever before. There are no local or detached problems. A few years ago the cost of government was light. Now it is so heavy that the most casual of business operations must be considered in the light of present and prospective policies in finance and taxation. These facts emphasize the need for the good citizenship already mentioned. He concluded with comments on the progress of the country during the past two years, pointing out that taxes have been reduced, business revived, the national debt lowered and a danger of a war in the Pacific removed.

President Emmons next introduced Thomas N. McCarter, president Public Service Railway of New Jersey, whose address is printed elsewhere in this issue.

The final speaker of the evening was former Vice-President of the United States Thomas Riley Marshall, who spoke largely in a humorous vein and was very well received by the audience. He said it was quite the thing nowadays for people to run a husiness who know nothing about it. He, therefore, suggested that since the men assembled represented the stockholders and bondholders of the electric railways that he as a strapholder should undertake

to tell them how to run their business. He suggested that the heautiful array of flowers on the tables be sent to the District of Columbia committee that is trying to establish the 5-cent fare, thinking it might help. But us the dinner committee had already made arrangements to send the flowers to the Children's Hospital in Washington it could not comply.

For many years it has been the doctrine, Mr. Marshall said, that every one is just as good as any one else and is just as competent and has just as good a right to run things as the fellow who is responsible. The former vice-president differed with this theory. He said we must come to understand that some men are made to do some things and others are intended to do other things and that the quicker we come to appreciate this the sooner we will have peace in this country. While it has been



THOMAS RILEY MARSHALL Former Vice-President of the United States

maintained that the common school education is going to be the salvation of this country, he maintained that when a born chicken thief is educated up to be a forger a distinct harm has been done. He emphasized that it is not the position in life one holds but the way he fills his position that counts.

He spoke of the troubles of the electric railways, but urged that it we are to measure accomplishment only in terms of dividends and bank balances we had better quit. He said he wanted the railways to make money and make plenty of it, but to make it by methods so clean that every dollar might be used for an infant to cut its teeth on without getting a single microbe. The real reward of our business will be the degree of service to the public.

In speaking of the changed economic situation of today which has called for big business as a necessity, it has tended to submerge the contact between corporations and labor. He admonished the assembly, if it would bring peace, to forget the law of the land and get a means of contact between the companies and the employees which would bring understanding. Differences should be threshed out by the spirit of democracy, which is the spirit of good fellowship, not by the legal rights available.

Ladies Are Entertained

AN ATTRACTIVE program was arranged for the ladies in attendance at the midyear meeting. The first event was on Thursday afternoon, when a trip was made to visit the grave of the unknown soldier at Arlington. This trip was followed by a reception and tea at the Willard Hotel.

On Friday morning the ladies were invited to participate in a trip to Mount Vernon by trolley, and this was followed by luncheon at the Columbia Country Club. Many of the ladies attended the banquet in the Willard on Friday evening, occupying the gallery.

The ladies' reception committee consisted of Mrs. W. F. Ham, Mrs. C. D. Emmons, Mrs. J. H. Hanna, Mrs. C. S. Kimball, Mrs. J. H. Stephens, Mrs. M. G. Stratton and Mrs. R. H. Dalgleish.

Washington Paper Gets Mixed on Titles

THE Washington Times for Feb. 15 published an article entitled "1,000 Here for Electric Rail Sessions," hut necompanied it by a group picture of various officers of the association with a caption reading: "Officials of the Washington Real Estate Board, who will undertake, through a nation-wide campaign, to bring the headquarters of the Natlonal Association of Real Estate Boards to Washington. The headquarters are now maintained in Chicago. The board will hold a meeting tonight, when important action toward this end, it is said, will be taken."

The group view shown of the officials of the "Real Estate Board" were those of the American Electric Railway Association.

American Association News

Committees Meet at Washington

A Large Number of Committee Meetings Were Held Previous to the Opening of the Midyear Meeting of the American Electric Railway Association and Much Valuable Work Was Accomplished

DURING the two days prior to the midyear conference, on Feb. 16, a number of committees of the American, Engineering, Transportation & Traffic and Claims associations held meetings in Washington. Some of these were the initial meetings and were for the purpose of organizing the work for the year, while others were to carry on work started earlier.

American Executive Committee

The executive committee of the American Electric Railway Association met at the Willard Hotel, Washington, D. C., on Feb. 15. Those present were: President C. D. Emmons, Executive Secretary J. W. Welsh, R. P. Stevens, C. E. Morgan, J. N. Shannahan, H. D. Shute, Arthur Halc, F. R. Coates, W. H. Sawyer, J. G. Barry, M. B. Lambert, E. F. Wickwire, C. L. Henry, L. E. Gould, L. C. Datz, G. T. Seely, L. G. Nicholson, Carl Beck, L. H. Palmer and J. W. Colton.

Brief progress reports were heard from the membership committee, the committee on co-operation with state and sectional associations, national joint committee of utility associations, committee on national relations, committee on location and exhibits, and committee on co-operation of manufacturers. Mr. Datz presented a recommendation of the Engineering Association executive committee that publication of the Engineering Manual as a bound volume to supersede the loose-leaf form in which it is now printed be authorized. The idea would be to publish this volume completely every three or four years as a revision became necessary and supplement this by the publication of a supplement each year. This was approved by the executive committee, and the engineers were requested to give consideration and make some recoinmendation as to what charge should be made for this volume and whether copies sold to member companies as well as those sold to individual members and non-members should be charged

Upon recommendation of Mr. Datz, the executive committee also approved a special session at the annual convention for the purchasing agents and storekeepers, under the auspices of the Engineering Association, provided this meeting was not scheduled at a time to conflict with the meetings of the American Association.

In making the report of the committee on co-operation of manufacturers. Mr. Wickwire pointed out that good results were being obtained from about thirty manufacturers, but that the others had not responded. He said that the work of this committee had gone far enough to determine that it was a feasible work and that nothing unreasonable was being asked of the manufacturers. The committee itself had been unable to get any co-operation from most of the manufacturers and he thought that about the only way this could be accomplished was for the railway people to bring pressure to bear upon those who have been indifferent to the committee's work. In other words, the condition should be brought about that manufacturers would know that lack of co-operation on their part will be noticed.

Mr. Henry, reporting for the committee on national relations, said that the Interstate Commerce Commission had reached a décision on the interchange mileage plan and that, as expected, the electric railways have been excluded from its provisions. However, any company not included under the decision may apply to the commission for permission to take part in the interchange or coupon arrangement.

A letter received from H. E. Fisher, chief surgeon Chicago Elevated Railroads, suggesting the organization of a section of the American Association for the physicians and surgeons connected with electric railways, was referred to the committee on policy. It was indicated that some provision will be made at the next convention for either a special meeting for the physicians and surgeons or a session of the T. & T. Association which will be of particular interest to them.

The next meeting of the executive committee will be held on Friday, April 6, at 10 a.m. in headquarters, New York.

T. & T. Executive Committee

At a meeting of the Transportation & Traffic executive committee on Thursday morning there were present: President G. T. Seely, W. H. Boyce, J. K. Punderford and Edward Dana. Progress reports of the various committees were read and generally approved. Various business matters and plans for the next convention were disposed of. A plan suggested to have a

paper on the use of the radiophone in train operation was dropped on account of the finding that insufficient experience had been had along this line as yet by any railroad company to warrant a paper on the subject.

Engineering Executive

The Engineering executive committee meeting was held at the New Willard Hotel, Washington, D. C., on Feb. 15. Those present at the morning session were: President L. C. Datz, H. A. Johnson, R. C. Cram, C. R. Harte, Daniel Durie, C. H. Clark, R. H. Dalgleish, H. H. Adams, J. H. Hanna, C. S. Kimball, G. C. Hecker, and J. H. Stephens.

It was decided that the bibliography on heavy electric traction should be turned over to Prof. R. G. Warner of Yale University for correction.

Criticisms of the report of the subcommittee on revision of the rules for adoption of standards received from Mr. Johnson and others were read. The section pertaining to the details of voting was held in abeyance until a report of Mr. Kimball's committee on the method of weighting votes had been received and approved.

The report of the committee on manual, of which Mr. Cram is chairman, was received. One of the outstanding features of the work of this committee is the plan to publish the manual in bound form. The report discussed in considerable detail the renumbering of the specifications, the elimination of historical data pertaining to specifications, and revision of drawings to eliminate folded pages. The estimated cost of the manual as submitted was approved and a resolution was passed requesting the American executive committee to authorize the expenditure.

A communication from the American Engineering Standards Committee was read requesting the association to accept sponsorship of a sectional committee to reconsider specifications for 7-in. 80-lb. and 91-lb. plain girder rails and for materials for use in the manufacture of special trackwork. The association had submitted to the American Engineering Standards Committee these specifications some time ago, but on recommendation of the special committee of the A.E.S.C. they are to be referred to a sectional committee comprising all interested parties.

The American Engineering Standards committee has approved the American Electric Railway Engineering Association specifications on girder grooved and girder guard rails and joint plates. The manual committee was instructed to get up title pages for these specifications, designating them as American Standards.

A request of the purchases and stores committee that it be permitted to hold a separate session at the time of the next convention was approved subject to approval by the American executive committee.

At the afternoon session Messrs. Datz Johnson, Durie, Harte, Clark, Datgleish and Hecker were present. The subject of a proper and adequate numbering system for drawings used in the manual and the proceedings was discussed at some length and then assigned to the manual committee.

Claims Executive

A meeting of the executive committee of the American Electric Railway Claims Association was held at the Washington Hotel Friday morning. The following members were present: Wallace Muir, president; E. L. Lindemuth, secretary; W. H. Hyland, H. D. Briggs, T. B. Donnelly, S. J. Herrell, Joseph Kubu and L. F. Wynne. H. V. Drown, S. B. Hare, C. B. Proctor and G. T. Hellmuth were also in attendance at the meeting. The following committees made reports: Accident prevention, automobile accidents, claims department costs, and subjects. The president appointed E. L. Lindemuth chairman of the attendance committee for the next annual convention of the assoclation, with power to appoint a member of the committee from each state.

The tentative program suggested by the committee on subjects for the next annual meeting included papers and reports on the following topics:

MONDAY

Paper on "A Code of Ethics," by Hon, Russell A. Sears, Boston Elevated Railway.

Report of the committee on claims department costs, accompanied by a paper, by W. E. Robinson, Cincinnati Traction Company, to be followed by a written discussion by H. V. Drown, Public Service Rallway of New Jersey.

Submission of questions for the Question Box.

TUESDAY

Report of the committee on the automobile accident situation, accompanied by a paper by G. T. Hellmuth, Chicago Elevated lines and North Shore Railway.

Two papers on "Automobile Accidents," one to be from the transportation standpoint, by Ralph Emerson, Cleveland, Ohio, the other to be from the claim department standpoint, by L. F. Wynne, Atlanta, Ga.

WEDNESDAY

This session to be devoted to a joint meeting of the Claims and Transportation & Traffic Associations, with the report of the committee on accident prevention, H. O. Allison, of the Beaver Valley Traction Company chairman, to be followed with a discussion for the claims department by W. G. Fitzpatrick, Detroit, and others.

THURSDAY

Paper on "Preparation of Litigated Claims," by Mr. Livingston, Boston, Answers and general discussion of questions previously submitted for the "Question Box."

Dinner and Location

The midyear dinner committee met on Wednesday afternoon to complete final arrangements for the banquet and assign tables to the guests. The com-mittee on location of the next annual convention met on Thursday morning and decided to recommend that exhibits be held. Reports were heard from subcommittees which had investigated Detroit, Buffalo and Atlantic City as locations for the convention and numerous details were given full consideration. The committee then gave its approval to a report to be presented to the American executive committee for its decision. Those present at this meeting were: Chairman C. E. Morgan, Col. A. T. Perkins, Secretary J. W. Welsh, Fred Dell, John High, H. L. Brown, A. M. Robinson, C. L. Van Auken, George Barnes, J. C. McQuiston, L. W. Shugg and A. L. Price.

Valuation Committee

The valuation committee of the American Association met on Thursday in Washington with Chairman J. P. Barnes, W. H. Sawyer, J. A. Emery, Col. A. T. Perkins, L. R. Nash, W. H. Maltbie, E. J. Bechtel, Frank Silliman, Jr., and J. B. Klumpp present. As this was the initial meeting of this committee, the discussion was principally in the direction of determining what the work of the committee should be this year. Two definite subjects were decided upon and sub-committees appointed to follow them up. One of these was a study on price trends of railway equipment and materials, as it was thought that the war conditions have perhaps now passed sufficiently so that the curve may be taking on some semblance of stability again. The sub-committee appointed to follow this was A. S. Richey and L. R. Nash. The other study that will be undertaken will be the determination of the relative weight to be attached to the various methods of valuation in arriving at the valuation of a property for rate-making purposes. This will probably resolve itself into an outline of the method of determining the proper weight to give each basis of valuation in any specific case. The sub-committee appointed to study this subject and report to the committee was Messrs. Maltbie, Bechtel, Klumpp, Silliman and Emery.

Bus Operation

The committee on hus operation of the Transportation & Traffic Association met on Feb. 15 in the office building of the Washington Railway & Electric Company. Those in attendance were: W. J. Flickinger, New Haven, chairman; W. H. Burke, Boston; A. H. Ferrandou, Washington; R. N. Graham, Youngstown, and J. M. Ives, Danbury, with J. K. Punderford and Edward Dana, sponsors. The answers to the questionnaire sent out by the committee were gone over and will be tabulated. It was decided to hold the next meeting early in April.

Rail and Wheel Contours

A meeting of the Engineering Association committee on rail and wheel contours was held in the morning and afternoon of Feb. 15. Those present were H. H. Adams, chairman; J. H. Hanna, vice-chairman; C. A. Alden. Victor Angerer, H. Fort Flowers, J. M. Larned, A. D. McWhorter, A. J. Miller and J. F. Miller. The committee considered the report of a sub-committee on the subject, consisting of Messrs. Angerer, Flowers and A. J. Miller. This committee submitted a number of wheel contours for consideration, together with an exhaustive study of the relation of wheel contour to rail contour. After considerable discussion the committee authorized the sub-committee tentatively to prepare eight wheel contours, these to apply to both chilled wheels and steel wheels. Mr. Flowers, who had been appointed a committee of one to take up the question of the contour of the head of a plain girder rail, submitted a report. This report was referred to a sub-committee consisting of Mr. Alden, chairman, Mr. Larned and Mr. Flowers, for further report. This committee was also instructed to consider the contour of a girder guard rail.

Special Taxes

There was a meeting of the American committee on special taxes at Washington on Feb. 15. Those present were W. H. Maltbie, Baltimore, chairman; H. D. Sawyer, Boston; A. J. Neal, Washington, representing W. F. Ham, and F. W. Doolittle, representing Edwin Gruhl. The discussion was largely along three lines, namely, to send out letters and find what public burdens are being carried in order to determine so far as possible the relation of the total public burden to the gross receipts; second, to try to start a movement for the simplification of taxes and, third, to enlist the co-operation of other national organizations that are interested in the problem of public utility taxation.

Coffin Foundation Committee Meets in Washington

HE first meeting of the committee which will have charge of the award of prizes for the Charles A. Coffin Foundation, recently established by the General Electric Company, held its first meeting in Washington, D. C., on Feb. 15. As specified by the provisions of the Foundation, the railway committee is composed of the president of the American Electric Railway Association, the chairman of the policy committee, and a third member selected by these two. President C. D. Emmons, Britton I. Budd, and James H. McGraw, president McGraw-Hill Company, who was selected as the third member, constituted the present committee.

At the Washington meeting a tentative letter was drafted for transmittal to the presidents of railway companies to inform them of the provision of the Foundation and to urge participation of their employees. The committee further laid out its plan of activity during the year.

Progress Report of Committee on Co-operation of Manufacturers

THE following progress report was presented to the American executive committee at its meeting on Feb. 15 by E. F. Wickwire, chairman, for the committee on co-operation of manufacturers:

An outline of the activities of your committee on the co-operation of manufacturers was printed in the February issue of Aera. This article gives an itemized account of the work that some of the leading manufacturers of the country are doing.

The article in Aera was compiled from answers to a questionnaire sent out recently and shows that about thirty important companies are carrying on the work intensively. Our records convince us that many more companies are engaged in the work, in one form or another, but failed to reply to the questionnaire. Why they are so secretive when they are not in the bootlegging business your committee cannot see, unless they feel that the electric railway companies are not observing the progress of our efforts closely enough to know what manufacturers are doing their part, and what concerns are not responding as they should.

There is every reason why electric railway men should lend real assistance to this committee by telling manufacturers that this work is important and that they notice it and appreciate it. The time has come for manufacturers to show where they stand on the issue, and your committee cannot understand why any manufacturer should hesitate to make clear his connection with the street railway industry and his interest in its welfare. It is a plain matter of self-interest on the part of the supply men for them to co-operate in improving the public relations of the industry upon which they depend for their livelihood. If they are not awake to that fact it is a kindness to set off the alarm clock in their ears. There are plenty of examples of companies who are successfully co-operating and accomplishing worth - while results. With the way made clear before them, there seems to be no excuse for any absentees in the roll call.

As a matter of fact, the work is progressing and plans for the immediate future will doubtless show still greater and more tangible results.

One of the outstanding things that manufacturers are doing now, under the general direction of your committee, is to co-operate with the local railways in an endeavor to cut down accidents. The manufacturer is in a very good position to carry on this work. Particularly, as a third party, he can induce local garage owners to

put up posters which are being distributed through the advertising section, and thus be of great help. Two accident prevention posters have already been well and widely used in this manner.

The financial reports of the electric railway business during last year are just now becoming available. They reflect great credit on the industry and are to be used in many ways. Manuscripts for two articles which will be incorporated in material for speeches and also in booklets for general distribution are ready and will be sent out after this meeting. One of them is filled with facts which show that the industry is playing square with the people and is improving its service and its value to the public.

The other article, which will soon make its appearance in pamphlet form, may be used either for a talk or for general distribution. It brings out the enormous purchasing power of the industry and is directed to manufacturers' organizations with the idea of impressing upon them the fact that the electric railways are going to be good customers during the coming year and that they can help them to remain good customers. When we succeed in getting the individuals in these organizations to visualize their direct connection with the prosperity of the railways, they will be willing to ride a porcupine through a bed of cactus, to see that the railways are properly treated. This booklet also explains why it is necessary for electric railways to keep fares at their present level, and it discusses bus competition, special tax burdens, and other problems.

Plans for several other booklets are now being made. They will treat of paving relief, the necessity for the electric car, bus competition, etc.

Your committee is utilizing the radio in the dissemination of electric railway publicity material. On the night of Jan. 8, from the Pittsburgh station of the Westinghouse Company, the entire annual report of President Emmons was broadcasted. The advertising section now is preparing a series of five articles on the history of electric railway transportation which will be broadcasted later by the same station. Right here your committee wants to express its appreciation of the excellent work which Labert St. Clair, director of the advertising section, has done in the way of co-operating with the committee and supplying material for

Manufacturers are using the regular monthly issue of *Truth* in encouraging numbers, and many have assigned special bulletin board space to it. One company has erected 100 special bulletin boards for its display, and smaller companies are displaying it proportionally.

Truth is really the backbone of our efforts in more ways than one. In the first place, misleading statements would get us nowhere and only create bad feeling. And in the second place, we could not hope to deceive the public

even if we wished. Your committee would be seriously handicapped, in fact entirely helpless, if the electric railways were supplying poor service as an accompaniment to the efforts of the manufacturers. But, fortunately, taking the country as a whole, the electric railways are rendering the kind of service that makes our work easier and which furnishes the necessary groundwork for the success of our undertakings.

We urge that strong and continuous appeals be made to more and more manufacturers to use their best efforts, through the use of their shop papers, house organs and other effective channels, to reach their workmen, the men in overalls, those who ride in our cars and exert a strong influence on public relations. We suggest further that all manufacturers send regularly to our association headquarters copies of their shop publications and house organs so that we may know what manufacturers are co-operating in this movement.

In closing, the committee wants to emphasize again the importance of having the railway companies express their active interest in this work. Your committee is not requesting you actually to discriminate in favor of the manufacturer who is doing his part, but it is requesting you to ask the supply men, who are not using their strength, how they can reasonably expect to derive prosperity from the industry without putting a proper effort into the upbuilding of the business.

Information and Service

THE American Electric Railway Association has issued the following special reports which are available to member companies upon request:

"Trend of Trainmen's Wages, 1914-1922." This shows the maximum wage rate and the number of years of service necessary to reach it for the years 1914 to 1922 inclusive, for a large group of companies.

"State Versus Local Regulation." This is a compilation of arguments, reports, decisions, and expressions of opinion by experts and public men on this subject, indicating the trend of thought on regulation.

"Securities Issued by Public Utilities in 1922." This is a list of the new securities divided between electric railways and other public utilities showing type of securities, amount issued, maturity dates, interest rate and offering price.

"One-Man Car Operation." This is a supplement to the compilation of last Jan. 1, in which replies from thirty-one additional companies to the questionnaire sent out are summarized, giving also a complete general summary of all of the replies received, 140 in number.

In addition to the above supplement, a Fare Bulletin, Wage Bulletin, and cost of living studies have been prepared, bringing these compilations up to date.

News of Other Associations

Observations on European Traction

Practice Regarding Type and Character of Rolling Stock, Electric Drive for Locomotives and Voltage Used in Electrification of Lines Is Commented Upon

BY W. B. POTTER

Clab & Engineer Railway and Traction Department, General Electric Company

HE development of rail transportation since the day of stage coaches and horse-drawn tram cars has been a process of evolution in which some reminders of the past are still noticeable. Before the days of steam the track gage used for the tram cars of the British coal mines was presumably the origin of the odd dimension of 4 ft. 84 in., which has become so generally accepted as the standard track gage of the railroads of today. In Great Britain freight cars are still called "waggons," and many of the older passenger vehicles there and on the continent are a sort of multipleunit stage coach as if several coach bodies were mounted on a flat car, and to carry out the illusion, the exteriors of the separate compartments are sometimes so paneled as to resemble the outlines of a coach. The doors, windows and the interior are as nearly like the old stage as one could imagine. not omitting the looped strap arm rest for those sitting at the ends of the seats.

Our first electric cars were converted horse cars, and in keeping with their previous motive power there was at first a disposition to use much smaller motors than were suitable. About 13 hp. was probably a fair average for the old horse car; and where two horses had served, an equipment of two 10-hp. motors seemed out of proportion despite the improvement in schedule.

While the speed was limited in the horse car days there was progress in other respects, of which one instance is worthy of note. Perhaps some of you may remember the red glass panel in the monitor of the Stephenson horse cars that once ran in New York. This panel was inscribed with the legend: "This car is equipped with supersprings, contributing to quiet and ease." You may also remember riding in these cars and the comfort derived from reading this sign at at least had the merit of autosuggestion.

The single truck of the old horse car was not suitable for the higher speeds and longer car bodies required in electric service. The bogie of double-truck motor car so generally used today was a natural adaptation from steam rallway practice.

While there is a similarity in the

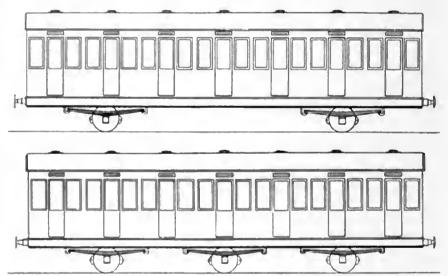
*Abstract of paper presented at midwinter convention of American Institute of Electrical Engineers New York Feb. 11 14 1922

character of traffic and the conditions under which it is being carried on in the European countries, there is a great difference in these respects between Europe and this country. The influence of precedent, experience and individual opinion under these quite different conditions has naturally led to a different viewpoint and to some differences in practice between this country and Europe.

The weight of European freight trains and the maximum drawbar pull

in diameter; the right one having a rounded face and the left hand a flat face, these are located near the outer end corners of the car. The initial tension on these buffers is about 2,000 lb., and when fully compressed the pressure is approximately 20,000 lb. As might be expected, there is ordinarily no shock when coupling with this kind of a coupler, as a slight compression of the buffers is all that is required. With our automatic couplers the shock of coupling is occasionally in the nature of a crash

Admitting the advantages of the automatic type of coupler, the use of the screw coupler does permit a much lighter end framing on locomotives and cars. An inquiry as to European experience with automatic couplers brought forth the comment that the couplers were all right, but that the



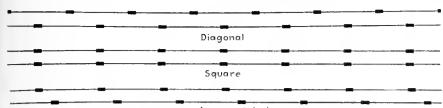
ture with Two and Three Axle Trucks Used on European Rallways

allowed are about one-quarter of what they are in this country. The weight of their passenger trains is about one-half. The permissible weight on driving wheels is about two-thirds and the weight per axle of their cars is about one-half of our usual practice. The low drawbar pull and car weight permit a relatively light mechanical design of rolling stock, and the requirements as to strength are further made easier by the method of car coupling.

The screw coupler, i.e., two clevises connected by a rod with a right and left-hand thread, is used almost universally. Each drawbar has a hook that is provided with a icrew coupler, and in the process of coupling the clevis of one of the couplers is thrown over the hook of the other drawbar, and the cars in effect are jack-screwed together by hand. There are two mushroomshaped buffers with faces about 1 ft.

process of coupling wrecked the rolling stock. Allowing for various requirements, the weight of European electric locomotives is from two-thirds to three-quarters the weight of electric locomotives having the same horsepower in this country.

The speed of European trains on the average is rather higher than in this country. Many of the European cars have two or three axles, which does not seem to be a wheel arrangement that would provide for smooth running. In many instances these cars have no truck framing, but depend upon the car springs to hold the axles in alignment. These springs are usually about 6 ft. long and semi-elliptical in shape, although so little curved as to be nearly flat. The springs bear directly on the journal boxes and are so resilient that the vertical shock from track joints is very well cushioned. The shorter wheelbase two-axle car and many of



Asymmetrical

Plans for Locating Track Joints as Affecting Transverse Oscillation of Cars

the three-axle cars have a tendency toward transverse oscillation, which may be decidedly uncomfortable unless the cars are properly coupled together.

The combination of the screw coupler and buffers has more influence in steadying the car and preventing oscillations than might be supposed. When the coupling is set up sufficiently to compress the buffers, the friction between them is sufficient to prevent any relative movement so that each car is steadied by the one to which it is coupled.

On a fast train made up of similar cars having bogie trucks, there was a noticeable difference in the riding qualities of those cars on which the couplers had been screwed up and certain others so loosely coupled that the buffers did not touch. It is the usual practice to screw up the coupler sufficiently to compress the buffers, but there are exceptions. A remembered instance was a trip on a two-axle car of about 14-ft. wheelbase which was loosely coupled to the rear end of a passenger train. At a speed of about 55 miles the transverse oscillation, or "side slogger" as it has been called, was so bad as to cause some apprehension to the uninitiated. At the first stop the coupling was screwed up, which was all that was necessary effectually to check the "slogging." The frequency of these transverse oscillations appeared to be the natural period of the car body as established by the scheme and proportions of its flexible supporting structure. The track did not seem to induce any supplemental oscillation.

The method of locating track joints perhaps has more influence on the running quality of the rolling stock than is commonly appreciated. The European practice is to lay the track with square joints, i.e., with the joint of each rail directly opposite. The customary practice in this country is to lay the track with joints spaced diagonally and located midway between the opposite rail. The trial run on an electric locomotive over a track with square joints. which were in poor condition, afforded an exceptional opportunity to observe the reaction of a track with this arrangement of joints. This locomotive had bogie trucks, and at about 60 m.p.h. there was a very decided vertical vibration but no tendency whatever toward enforced side oscillation. With diagonally laid joints, in as poor condition, it is questionable whether any locomotive or car could have been run at that speed without something giving way; particularly if the transverse oscillation, which is diagonal in direction relative to the track, had happened to synchronize with a diagonal location of the low joints. Only one railway in Europe was noted where the rails were

laid with diagonal joints. The manager remarked that his electric motor cars were subject to so much oscillation that it was his intention to relay this.

A comparison of the influence of square and diagonal joints on the running qualities of a motor car was recently observed in this country over a line having both kinds of joints. On the portion of track having square joints there was observed a slight steady oscillation of uniform character at the rate of about 150 per minute; on the portion of track with diagonal joints the same car did not oscillate with equal steadiness and at times had a noticeable swing toward one side or the other. As the car was running at about 60 m.p.h., the natural period of oscillation did not correspond with the location of the diagonal joints. Had the vibration synchronized with the joints, an enforced and increased oscillation might reasonably have been expected. This particular track was in good condition throughout.

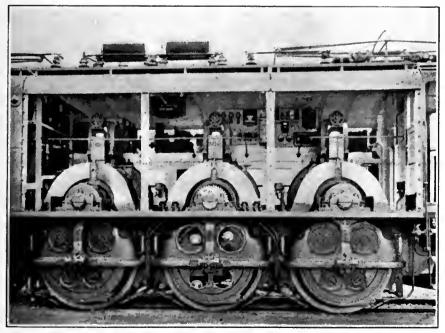
There is no doubt that track laid with square joints is more difficult to keep up as the impact on the ballast is more severe when both wheels strike the joints simultaneously. With the less weight per axle customary in European practice, it is much easier to maintain their track than it would be with our heavier weights per axle.

ASYMMETRICALLY SPACED JOINTS SUG-GESTED FOR STEADIER RUNNING

The writer suggests that it might be possible to secure the advantage of diagonal joints in respect to track maintenance and the steadier running quality of square joints by laying the track with joints asymmetrically spaced, that is, instead of overlapping a half rail length, to overlap between one-quarter and one-third, preferably a length of lap that would not be an even fraction of the rail length.

There was observed on the Great Northern Railway, England, an articulated arrangement of cars into groups, which is a departure from the conventional car with two bogie trucks. This articulation is accomplished by locating a truck midway between each of the several cars in the unit group, so that the number of trucks is only one in excess of the number of cars constituting the group. In the suburban service the trains were composed of two groups each of four cars, this requiring ten trucks for the eight cars. On the main line the train was made up of a number of individual cars and a five-car articulated group. The reduction in weight, compared with two bogie trucks for each car, was said to be about 10 per cent; it was also stated that the train friction was reduced. A noticeable feature on the main line train at high speed was the smooth running of the group; the riding was exceptionally good and noticeably better than individual care in the same train.

In the brief reference to electric locomotives, the motor car and steam locomotive were mentioned as prototypes



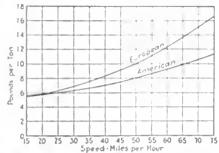
Locomolive with Outside Gearing on the Drive Side with Outside Sheeting Removed

which have influenced the trend of electric locomotive development. To elaborate, there are at least seven general designs of driving mechanism or methods of motor mounting under which electric locomotives may be classified. These different methods may be briefly described as axle geared, quill geared, outside geared, axle gearless, quill gearless, direct connected side rod and geared side rod.

Each of these methods of drive, with the exception of the outside gear, are employed in this country. In England the axle-geared drive has been most generally used, but there has been completed recently a high-speed locomotive for the North Eastern Railway equipped with the quill-geared drive. The side-rod drive does not seem to have met with favor; the following reference to side-rod drive is quoted from a paper by Sir Vincent Raven (North East Coast Institution of Engineers and Shipbuilders, Dec. 16, 1921):

"On the Continent, notably in France, Switzerland, Italy, Germany, Austria and Sweden, the connecting-rod drive in one form or other is almost universal. Up to the present electrification in these countries has been carried out mainly on the single-phase or three-phase system, and continental engineers consider that the additional complications caused by the introduction of cranks and coupling rods are more than compensated for by the advantage of having a free hand with the motor design.

"A large number of designs have been worked out. Some have proved quite satisfactory, others have given rise to a good deal of trouble. In most cases



Graphs Showing Relative Train Friction of European and American Passenger Tealns

the trouble has been eliminated by strengthening up special parts such as crank pins, Scotch yokes, etc., and by introducing a certain amount of flexibility into the connections between the motors and the crankshafts."

The mechanism of the motor-driven side-rod drive needs to be maintained in close adjustment and may reasonably be expected to require more attention and have a higher cost of maintenance than some of the other methods of transmitting power to the drivers.

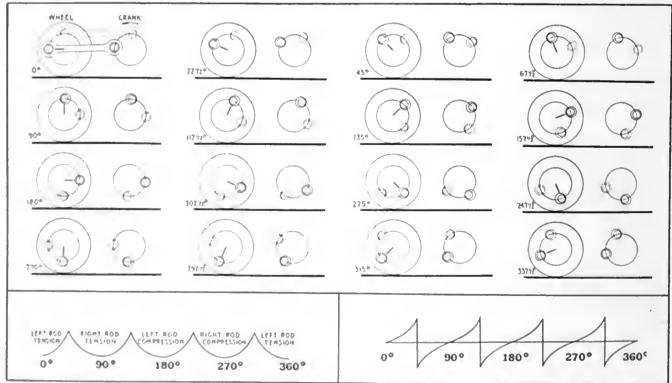
The transmission of power from a motor-driven crank, whether direct connected or geared, introduces strains in the connecting mechanism somewhat different from those which occur in a steam locomotive. With the best adjustment and with operating clearance only in bearings, the motor-driven connecting rods on either side transmit alternately the power through 90 deg., except for such spring of the parts as may cause the rods to work together for a brief interval. As this transfer of the power from one rod to the other

takes place at about 45 deg. from the dead center, the pins, connecting rods and included frame will be subjected to the full strain of driving when the crank is at an angle of about 45 deg. If the two sides are not in even adjustment this angle may be even less.

Aside from centrifugal forces and the shock due to lost motion in the driving mechanism, the stress in the rods, pins and frame of a steam locomotive is limited and may be predetermined from the size of the cylinder and steam pressure. With a motor-driven crank the stress is dependent on the crank angle and is affected by the adjustment of the mechanism.

As an extreme illustration, one side of a steam locomotive may be stripped and with the other side on dead center the throttle may be opened wide without damage to the locomotive. Under the same conditions with a motor-driven crank, the resultant toggle action would set up enormous stress and undoubtedly wreck some part of the mechanism involved.

There is, further, an irregularity in the angular rotation of the crank with respect to the driving wheel which creates a superimposed stress on the driving mechanism, and may be the cause of very disagreeable vibration should the natural period of the rotating mass involved happen to synchronize with the nodal points of angular variation. The effect of this irregularity in relative uniformity of rotation of the crank and wheel are more in evidence in some forms of side-rod drive than others. The most severe case observed was on a direct-connected locomotive with n V arrangement of connecting



Above—Action of Side-Hod Drive and the Effect of Clearance in Beneinge on the Belotive Angular Pasilion of the Crank and Wheels.

Hottom, Left—Characteristic of the Change in Angular Pasilion of the Urank with Respect to the Wheel. Boltom,

Hight—Characteristic of the Angular Velocity of the Urank with Respect to the Wheel.

rods which ran with but little vibration, except at the critical speed, when a knock developed which sounded as if the crankshaft was broken or being struck by a steam hammer. As this irregularity is due to the play in the bearings and the spring in the parts, it cannot be entirely eliminated in practical operation, but it may be minimized by maintaining the alignment and close adjustment of the bearings. It is obviously desirable to diminish the shock by cushioning as much of the rotating mass as possible.

H. Parodi, chief electrical engineer of the Paris-Orleans Railway, in the Revue Générale des Chemins de Fer of March, 1922, has written of the vibratory characteristics of side-rod drive and described the method he employed to improve the operation by the introduction of springs, permitting angular movement between the mass of the motor armature and the crankshaft.

ACTION OF SIDE-ROD DRIVE

An accompanying drawing illustrates the action of side-rod drive. The mechanism is assumed to be inelastic, the pin bearings of the rods are shown with exaggerated clearance, and the ordinates of the characteristic curves are greatly out of proportion. In reality, the value of these ordinates is dependent upon the working clearance in the bearings together with the inertia of the rotating masses, and whatever may be their actual value the character of the action calls for its consideration in the design of motor-driven side-rod mechanism. Furthermore, the arc of action and the sharp angles of the characteristic curves as shown would be modified by the spring in the connecting parts.

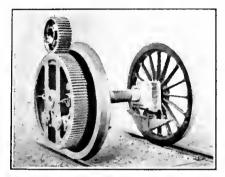
There appears to be an increasing interest on the Continent in other methods of drive requiring less attention and maintenance. The Paristorleans Railway has been operating axle-geared locomotives in its Paristerminal for more than twenty years and has recently ordered 200 of this type for local passenger and freight service on its main line extension. More than 100 locomotives of similar type are being built for the Midi and the State Railways. Locomotives with the same type of drive are also being built for the Spanish Northern Railway.

The electric locomotives on the Italian Railways are mostly of the direct-connected and side-rod type. The workmanship and finish of these locomotives is exceptionally fine, so good in fact, from our point of view, that we might consider it an extravagance. They are well maintained, are giving good service and many additional locomotives have been built from the same design.

The electrification of the railways in Switzerland has been very well carried out and they may well take pride in their construction and equipment. The Swiss Railways have a variety of locomotives which are principally of the geared side-rod type. The finish and workmanship of these locomotives is

excellent, and they are very fine examples of geared side-rod construction.

An interesting departure from siderod drive is a Swiss locomotive having the very novel design of an outside geared drive which is being given a thorough service trial with a number of locomotives. These locomotives have an inside frame the same as a steam locomotive, the motor being carried on the frame directly over the driving wheel. The armature pinion is located beyond the outer face of the driver. The gearcase is attached to the locomotive frame and is a strong structure provided with a pin in the center on which the gear revolves. The gear is carried about 3 in. from the outer face of the driver and within the gear is a system of balanced links which engage with the two pins projecting from the driving wheel. These links are so



Set of Driving Wheels with Outside Gearing

designed as to provide for independent movement of the gear and driver in any direction while still maintaining their relative uniformity of rotation. This locomotive runs very smoothly without any characteristic vibration, and the more general use of this type of drive on the Swiss Railways may reasonably be expected. These railways have also in trial service a number of locomotives with geared quill drive.

European motive power equipment is generally of more elaborate finish and gives the impression of being better maintained than is customary with us. An instance is recalled of two steam locomotives which were double heading on the London & North Western. One of these locomotives was built in 1897 and the other in 1867. They were polished and varnished with equal care and had every appearance of being of the same vintage until one observed the date label, and that the older locomotive had only one pair of drivers while the other had two. As an illustration of the greater attention given to details it is customary on many of the European railways to equip both steam and electric locomotives with a speed indicating and recording instrument. The record obtained is very complete, showing the speed at all times during the run, distance covered, time of the run and the location and duration of the stops.

The braking equipment of European trains is quite different from our almost universal practice. Their passenger trains are equipped with power brakes of either the vacuum or pressure type and usually with two brakeshoes per wheel. As there are several different braking systems in use, it is necessary in some instances to equip through cars, which run over different railways, with more than one system. In the trans-European service to Constantinople, it is said that each car has to be equipped with four different braking systems to conform with the regulations en route.

Power brakes are seldom used on the freight trains and some of the freight cars have no brakes whatever. In many of the freight yards there will be found wooden wedges, which are for the purpose of chocking the wheels to hold the cars in place. The hand-brake attachment to the braking system is usually through a screw and nut, instead of the chain and brake staff we commonly use. In some instances the brakes are applied only by a lever extending alongside. To handle freight trains on grades, where the brakes are necessary to control the speed, it is customary to provide a brakeman for every four cars. In ordinary freight movements the braking is done entirely with the loco-

The sliding contact for current collection from overhead lines is almost universal on the Continent for both tramcars and locomotives. Two triangular tubes of brass or copper are used for the contact on many of the Italian three-phase locomotives, and triangular blocks of carbon are used on some of the direct-current lines; but generally for tramcars and single-phase locomotives the collector is an aluminum bow of U-shaped section with a groove for lubricant.

In locomotive service it is the practice to use two of these bow collectors on each locomotive, and because of the soft material the pressure against the conductor is limited to about 8 lb. With this light pressure some arcing might reasonably be expected and is observable when collecting from a single wire. In some places two conducting wires with interspaced hangers are used, which is better for current collection than a single wire as it provides greater flexibility and doubles the collection contacts. Where the double wire construction had been used there was no observable arcing at the collector. While the aluminum bow serves its purpose well for collecting the 100 amp. or more for which it is used, it would not be suitable for collecting current of any great magnitude.

FOUR CONTACT COLLECTORS USED ON St. Paul Locomotives

Collectors of this type would by no means serve for the Chicago, Milwaukee & St. Paul locomotives, on which the current ranges from 800 to 1,200 amp. The collector used with these locomotives has two separate, flat, copper contact surfaces, while the overhead system has doubled wire conductors with interspaced hangers. This provides four independent contacts in parallel, each of which is $4\frac{1}{2}$ in. long.

so that theoretically the aggregate contact is a line 18 in. long. The pressure of the collector against the conductor is about 30 lb. The relatively large amount of current taken by these locomotives is collected with no observable arcing as the continuity of contact is well insured and the contact surface is of adequate capacity.

Any appreciable arcing at the contact between the collector and conductor is unquestionably more destructive to both than the wear that occurs from mechanical friction. Continuity of contact must be maintained if destructive arcing is to be avoided, and the design of the collecting system should be such as will best insure this continuity.

After investigating the various systems of railway electrification, a number of the European countries have established regulations in favor of a particular system for the electrification of their steam lines.

SYSTEMS OF ELECTRIFICATION FAVORED

France, Belgium and Holland have decided in favor of 1,500 volts direct current. The overhead system of conductors will, presumably, be used in these countries with but few exceptions. There was some discussion in France as to whether 1,500 volts should be the generated or the average voltage of the system. It was finally ruled that 1,500 volts referred to the generated voltage, but that a maximum tolerance of 5 per cent would be allowed. There are no electrified railways of importance in Helgium and no projects under immediate consideration. In Holland an initial electrification is being undertaken between Leyden and The Hague. this being a portion of the main line that will ultimately be electrified between Amsterdam and Rotterdam.

England has also decided in favor of 1,500 volts direct current, except in special cases, of which the London, Hrighton & South Coast Railway is an example. This railway is partially electrified with single phase and it is proposed to complete the electrification with this system.

It is presumable that a 1,500-volt third rall will be quite generally used in England. The Lancashire & Yorkshire Railway has been operating over 20 miles of third rail at 1,200 volts for some seven years. The North Eastern Railway has been operating 600 volts third rail for something over fifteen years, and has a more recent electrification with an overhead system at 1,500 volts. The London & South Western Railway has a 1,500-volt third rail under consideration. The South Eastern Railway, which runs near the Greenwich Observatory, is proposing to use two third rails with 3,000 volts potential between them, but with the generating and motive power equipment connected in three-wire relation to the track so that the voltage between each rall and ground will be only 1,500 volts. The purpose of this double rail arrangement is to eliminate currents

in the earth which might affect the observatory instruments.

The principal railways in England, some twelve in number, radiating from London, have recently been consolidated in four groups, corresponding to the northern, eastern, southern and western portions of the country. The purpose of these consolidations is to better co-ordinate the service of the railways in each group, and to direct the transportation of the country more effectively and economically through four general boards of directors instead of through the large number representing the individual railways.

There has been no official decision in Spain as to the system of electrification for the steam railways. There is in operation a short line equipped with the three-phase system. An important electrification on the Spanish Northern Railway over a mountain division in the north of Spain will soon be in operation with 3,000 volts direct current.

Switzerland has standardized the single-phase system at 16g cycles for the principal electrifications, and this system is being generally extended, although 1,500 volts direct current is being used on some of the smaller railways. For other than single-phase railways the standardized frequency is 50 cycles.

THREE-PHASE IN ITALY

The Italian electrifications are almost exclusively three phase, although there are several lines equipped with

STEAM RAILWAY ELECTRIFICATION

[toute Number of

	Miles	Electric Locumotives	
United States	1,607	375	
Switzerland	661	156	
France, .	602	338	
Italy	650	109	
Germany	550	49	
Sweden	217	44	
Cuba ,	180	18	
Austria	340	42	
Africa	174	77	
Chile	154	42	
England	129	12	
Spain	48	17	
Canada	49	9	
Japan	39	42	
Norway	39	37	
Mexico	30	10	
Brazil	26	16	
China	25	13	
Java	25	5	
Total	5,565	1,611	

600 volts and there is a recent installation of 4,000 volts direct current. Consideration is being given to a thorough trial of 3,000 volts direct current in the central portion of Italy south of the present zone of three-phase operation.

Germany is continuing the use of single phase for steam railway electrification, although it was stated that 1,500 volts direct current would presumably be employed for heavy multiple unit and interurban service.

The subject of electric railway systems is under discussion in Sweden. The more important existing electrifications are equipped with the single-phase system at 16% cycles. As the standard frequency for general purposes is 50 cycles, there appears to have arisen some question as to the ex-

pediency of generating and transmitting a particular frequency for the railways only. The more general utilization of natural resources and the better load factor resulting from diversity of use would seem to indicate an economic advantage in favor of generation at the standard frequency with substation conversion into whatever form of electrical power the railways may require.

The economy in fuel obtained by modern steam power stations and the many available sources of hydraulic power have contributed to stimulate greatly the electrification of the steam railways in Europe. Government indorsement of the projects has also been helpful in financing these enterprises.

The accompanying list, compiled from available records, will give an idea of the extent of railway electrification throughout the world. It includes the steam railways which have been electrified or are in process of electrification, but not the steam railways on which multiple-unit trains are being used exclusively, or electric railways which were not formerly operated by steam.

This is less than 1 per cent of the railway route mileage of the world. Conceding the efficacy of the steam locomotive for much of the world's service, there still remains a very large mileage which could be advantageously electrified. In the execution of this great undertaking we have many engineering and economic problems the solution of which demands the cordial co-operation of all who are engaged in the furtherance of railway transportation.

Electrified Road in Prospect

Col. L. A. May and a number of associates are planning the construction of a double-track electric railway from Muscle Shoals to Mobile, Ala.

For the past fifteen years Col. May has been working on this project. At first he planned to make this a steam road. Now that the government is building the Wilson dam at Muscle Shoals it is the plan of Col. May to electrify the road.

Several preliminary surveys of the road have been made in years past, but Col. May and associates expect to make another survey of the road at once, intending at the completion of this survey to offer the entire project to Henry Ford, when the Wilson dam at Muscle Shoals is finished.

The road is to be called the Mobile & West Alabama Railroad. The present officers of the road are: L. A. May, president; H. L. Brittain, Connecticut, vice-president; Jere Austell, Mobile, secretary; H. B. Urquhart, Birmingham, treasurer; George Clark, Birmingham, chief engineer. The directors are: A. L. Staples, Judge Robert T. Ervin, Jere Austell and H. H. Wefel, Mobile; L. H. DeFriese, London, Eng.; John J. Shannon and Dr. Wyatt Heflin, Birmingham, and L. A. May. The late ex-Governor Emmett O'Neal was one of the directors.

Midwinter Meeting of A.I.E.E.

THE eleventh midwinter convention of the American Institute of Electrical Engineers was held in New York City from Wednesday, Feb. 14, to Saturday, Feb. 17. The first session, held on Wednesday afternoon, was taken up with technical papers on power transmission and distribution. In one of these Prof. V. Karapetoff of Cornell University described a kinematic device by means of which the characteristics of power transmission lines can be computed mechanically.

On Wednesday evening a joint meeting of the members in attendance in New York and Chicago was held by telephone. One of the papers at this session was on "Observations of Electric Railway Practice," by W. B. Potter, General Electric Company. It is abstracted elsewhere in this issue.

At the Thursday morning session papers on a variety of topics were read. including one on "Automatic Train Control Problems," by E. J. Blake, Gould Coupler Company; one on "Application and Economies of Automatic Railway Substations," by L. D. Bole, Cleveland Railway, and one on "Single-Phase Regeneration for Series Commutator Motors," by L. J. Hibbard, Westinghouse Electric & Manufacturing Company. Mr. Blake's paper covered the general principles of train control systems, which are attracting widespread attention in the steam railroad field due to the intention of the I. C. C. to require them under certain conditions as soon as their design is considered sufficiently well advanced. This paper was discussed by Frank J. Sprague, who compared the different systems available and explained what a control system ought and ought not to do. Mr. Bole's paper was the same one which he read before the Cleveland section on April 18, 1922. He will have one or more articles in an early issue of this paper which will cover this subject fully. There was no discussion of this paper at the New York meeting. Mr. Hibbard's paper covered the subject of single-phase regeneration with particular reference to the regeneration of power in the alternating-current locomotive. His conclusion was that any future regenerative application that may be desired can successfully be taken care of with one or more of the single-phase systems now available.

The papers at the remaining session of the convention were of a special nature, in general outside the field of interest of the electric railway engineer. In addition to the formal sessions a smoker and a dinner-dance served to develop good-fellowship. Visits of inspection were paid to points of interest in New York City.

Wood Testing to Be Standardized

THE American Engineering Standards Committee is furnishing the being the a suspices for the standardization of specification methods of testing wood, recently undertaken by many interests involved. treads, etc.

The United States Forestry Service and the American Society for Testing Materials have been appointed joint sponsors for this undertaking, and the American Electric Railway Association is among the sixteen other organizations represented on the sectional committee on this subject. Henry Gulick represents the American Association. This work has been undertaken because there are no generally accepted specifications and procedure in regard to testing of wood, such as exist in regard to steel, cement and other products.

Central Accountants to Meet

THE Central Electric Railway Accountants Association will hold its forty-fourth meeting at Hotel Barr, Lima, Ohio, on Feb. 23 and 24. There will be four interesting papers as follows: "General Accounting with the Aid of Bookkeeping Machines," by Robert R. Peery, chief clerk Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.; "Light and Power Accounting with Aid of Machines," by J. B. Mahan, chief clerk Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.; "A Clearing House for Departmental Ideas," by A. R. Baxter, general superintendent Indianapolis & Cincinnati Traction Company, South Bend, Ind.; "Journal Entry of Agents' Station Accounts," by A. W. Heath, chief elerk Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.

The accountants will gather at a dinner on the evening of Feb. 23, which will be followed by several other interesting features.

National Safety Code on Walkway Surfaces Proposed

THE American Electric Railway Association, the National Safety Council, the National Engineering Societies and a number of others have been invited to participate in a conference to consider the advisability and feasibility of formulating a national safety code on walkway surfaces. This will be held in the Engineering Societies Building, New York City, on Feb. 14 at 9:30 a.m.

The importance of the subject of this conference is emphasized in a letter from a group of representative manufacturers of safety-tread materials to the American Engineering Standards Committee, which points out that approximately 15,000 persons are killed in the United States each year by falls of various sorts and that nearly one-half of these falls occur on stairs and floor levels. Fatalities due to falls constitute about one-fifth of the total number of accidental deaths from all causes.

The American Engineering Standards Committee, which has issued the call for the conference, has listed the subjects to be discussed, among them being the applicability of the suggested specifications to railway cars, railway stations, ramps, runway floors, stair reads, etc.

Business Education Needed on Electric Railways

BECAUSE they are able to view the problems of the electric railway industry from a fresh angle as compared with technically trained men, recruits to the industry's staff who have had business training are greatly needed at present, declared Dean Wallace B. Donham of the Harvard Graduate School of Business Administration, before the New England Street Railway Club at Boston, Mass., Feb. 8. Dean Donham was introduced by President A. E. Potter as a financial doctor who had prescribed successfully for the ills of the former Bay State Street Railway, the Donham receivership having marked a transition period in the road's history from acute economic distress toward stability.

Referring to a recent report of the committee on education of the American Electric Railway Association, Dean Donham said that he was not in agreement with the statement therein that to technically trained men the industry must look for leaders in future. Without deprecating the importance of engineering or the usefulness of technical men as executives, the speaker felt that the industry needs men trained in business and competent to view the problems of this difficult period in the transportation art with detachment from the technically trained man's "slant." More non-technical men are needed, men who see things in a nonmathematical way, possessing a perspective taking in the "human" element. The economic ills of some street railways are beyond cure, but in many other cases, the application of business judgment will go far toward restoring them to financial health.

Dean Donham said that when he became receiver of the Bay State company, technical men advised him to restore the old 5-cent fare instead of retaining the 6-cent unit; but as a banker he was unable to see how a company that had been unable to succeed financially on a 5-cent unit could be expected to do so by going back to the old standard. Rather, a 10-cent fare appeared more hopeful, and so through the changing of zone limits, etc.. the fare rate was increased and with good results.

From a recent statistical analysis of a large industry, the speaker was impressed with the decreasing percentage of engineers employed as the higher salaried positions were tabulated. In the lower grades of staff employment there were more engineering positions than there were opportunities for employing business-trained men, but this condition changed as the investigators approached the higher paid personnel. "Present-day technical training breeds a condition of mind that demands an antidote," said the speaker, "and the business-trained man offers this antidote to the industry. Where an engineer can rise above his technique and adopt a broad, detached view of affairs, he is invaluable, but such men are relatively few."

Preservation*

Scarcity of the Heavier Oils Has Retarded Wood Preservation Practices

ERNEST F. HARTMAN

President Protexol Corporation, New York City THE purpose of this paper is to develop information relative to the

comparative values of distillates of coal tar for wood preservation in particular reference to surface treatments.

There is need for greater recognition of the differences in preservative values between creosote and oils containing light oils and naphthalenes and anthracene oils. For open-tank surface treatments in particular the measure of success in results obtained lies principally in the permanence of the antiseptic.

Since the days of the earliest investigations, the greater all-around value of the heavier oils or, in other words, those which may distinctly be classed as anthracenes, has been recognized. In this country, the somewhat higher cost and until recently the general scarcity of the anthracenes have prevented the full development of the use of these oils in our preservative practices.

It is also quite clear that the element of cost difference no longer should mitigate against the deliberate selection of the anthracenes for use in surface treatment work, since it is fairly well proved that when the relative volatility of the lighter or creosote oils as compared with the anthracenes is considered, the cost differences are practically wiped out. In some experiments it has been shown that 40 to 50 per cent more light oil is required to accomplish the same net treatment cost result in surface work that may be obtained with the heavier or anthracene oils.

A study has been made of the author-Ities in these subjects and it appears that for surface treatments those creosote oils which contain large proportions of light oils and naphthalenes of very fugltive character should not be used for surface treatments. All parts of the oil should be stable and the writer's belief is that the anthracene olls more nearly meet all of the required qualities of a preservative for surface treatments than any other. All experiments and data to which the author has had access bear out this view.

The presence of water in oils used for surface and spray treatments provides an element of danger, and with anthracenes this element is reduced to a minimum or practically eliminated. By its evaporation its presence in any cil increases the volatilization of the other oily constituents.

In wood preservation, the object is to put off decay to the most remote

Preservative Oils for Wood date possible, thus reducing the annual charge. It follows that, the more permanent the preservative, the more permanent the results will be. In surface treatments, their very nature and use is such that evaporation is greatest from the outside and it should follow that the materials used for such treatments should be of a character having the greatest degree of inherent permanence.

The author's conclusion is that the anthracene oils represent the most permanent distillates obtained from coal tar that are useful in wood preservation, and that for surface treatments in particular the value of the more permanent qualities of the anthracenes should be more fully recognized.

Regulation of Motor Buses and Trucks

PAPER urging greater regulation A and taxation of motor buses and trucks upon the highways in Iowa was read before the Iowa Engineering Society at Des Moines on Jan. 24, 1923, by C. W. Eby, assistant engineer Waterloo, Cedar Falls & Northern Railway.

After pointing out that the cost of highways in Iowa has been increasing each year until in 1922 nearly \$12,000,-000 was spent on the primary roads alone, the speaker said that many of the taxpayers and the abutting property owners now consider they are not getting the benefit from this expenditure. He pictured an Iowa farmer who pays one-fourth the cost of road improvements on the road passing his property, watching this road torn up by heavy trucks which pay less into the highway funds than he does. At the same time the use of the roads is being made inconvenient to private auto owners because of the high speed and weight of the commercial vehicles which are in use upon them.

The speaker criticised the proposed uniform vehicle law of several automohile associations which would permit a maximum gross weight of vehicles of 14 tons and length of 30 ft. for a single vehicle and 85 ft. for a combination of vehicles, and he sketched in an amusing way the quandary of a private automobile owner caught on the highway between an 85 ft. highway stock train loading at the side of the road and an 85 ft. highway express train operating In the other direction. He also quoted extensively from Iowa and other papers to indicate that a sentiment is growing that such highway service is wasteful and costly. He also quoted from the message of President Harding to Congress on Dec. 8 to somewhat the same effect.

Mr. Eby gave a summary of the proposed motor vehicle regulatory law drafted by the committee of motor transport of the American Electric Railway Association. In conclusion he

In 1922 twenty-two states regulated motor carriers to a greater or lesser degree. lown did not. Twenty-two states, not the same once just mentioned in every case, collected

extra taxes from motor carriers, in addition to the rates levied on private automobiles. Iowa got no extra money from them. Regardless of the source of the suggested bill, I believe that it admirably meets the needs of the state of Iowa in the regulation and taxation of motor buses and motor trucks, and merits the attention of all people who are interested in the subject.

The Engineer as a Man of **Public Affairs**

THE colleges of the country are urged to "point engineers toward leadership in public affairs" in a report submitted to the Federated American Engineering Societies by its committee on industrial ideals, of which Prof. Joseph W. Roe, head of the Department of Industrial Engineering at New York University, is chairman.

The report stresses the need of the engineer in public life, asserting that he must aid in removing the difficulties of the material world which he has created. Carrying out the idea expressed by Edwin Ludlow, past-president of the American Institute of Mining and Metallurgical Engineers, that "this isan engineer's country but a lawyer's government," the report continues:

"For a century, engineers have directed their energy toward the utilization of the physical forces and the materials of nature. The developments which they have brought about have created an epoch in human history.

While these developments have been of inestimable benefit, and modern society could not exist without them, they have introduced many publicproblems and social readjustments, soclosely related to the engineer's activities that it is increasingly evident hemust assume an active part in their solution.

"Recognizing this growing need, the engineers of the country formed the Federated American Engineering Societies, primarily to place their knowledge and training at the service of the engineering public on all public matters affecting engineering, or affected by it.

"Engineering education, reflecting closely the attitude of engineers heretofore, has confined its work almost exclusively to scientific and technical training, giving little, if any, attention to the social and human aspects of engineering enterprises.

"The Federated American Engineering Societies, therefore, speaking for the engineering profession, urges upon engineering colleges an increased attention to the social aspects of engineering activities, and a broadening of their technical training, in every way possible, to develop in engineering students the spirit of, and a capacity for, activeleadership, not only in industry but in public affairs."

The other members of the committee. whose report has been adopted by the governing body of the federation, are: Mortimer E. Cooley, dean of the Engineering Schools of the University of Michigan and successor of Herbert Hoover as president of the federation; Prof. C. F. Scott of Yale University. New Haven, Conn., and J. C. Ralston of Spokane, Wash.

^{*}Abstract of paper read at convention of American Wood Preservers' Association New Orleans for Jan 22, 1923. Full test of paper will later be made available by the association

The News of the Industry

Union Men Discuss Legislation

Buffalo Strike, One-Man Cars and Other Matters Considered by New York Men

The problems confronting electric railway employees in New York State over the one-man car, the Buffalo strike and other matters were the principal subjects of discussion at the legislative conference of the Amalgamated Association of Street and Electric Railway Employees of America held at Utica on Feb. 12.

Eighteen delegates registered at the Michael Ward of the conference. Schenectady local presided as president. Legislative reports were read by Joseph S. Droogan of Albany, secretary and legislative agent, and P. T. Noon, financial secretary.

The association expressed a vote of confidence in its officers and re-elected them all for the ensuing year.

It had been intended to take up at length certain decisions of the Public Service Commission affecting the general welfare of the trolley men and to discuss other legislation, but as the feature administration bills relating to public service commissions had not been introduced at the time of the meeting at Utica, such action was deferred until another meeting.

Neither was there any general discussion of a plan for concerted action during the coming spring and summer. The meeting adjourned, after electing officers and listening to reports, agreeing to mark time until legislative action is taken on the public service commission bills, the trade commission bill and the bill which is now pending to incorporate labor unions. The union trolley men have lost prestige in the state during the last two years, and it seems very unlikely that they will attempt any drastic action which will entail industrial disputes in the near future.

Franchise Proposals Include Use of Bus in Saginaw

Saginaw will not want this spring for transportation proposals. Recent action by the Saginaw United Transit Company, asking that the Council submit a three-year franchise to the electors at the spring election on April 2, brings three propositions before the voters.

At the primaries on March 7 a tenyear franchise for the Saginaw Motor Omnibus Company, a \$500,000 corporation, will be submitted. If this does not carry there will be a street car-bus franchise and the one now proposed by the transit company, which is the outgrowth of the jitney bus men's association.

If the omnibus franchise passes naturally the other two will not be submitted. George R. Bidwell of New York, who is one of the men in the omnibus company, expects to carry on a campaign looking to the adoption of the grant. Otto Schupp, trustee in bankruptcy of the Saginaw-Bay City Railway, who was grantee under the street car-bus franchise that was defeated by seventy-two votes, announces that the proponents of the franchise will not appeal the case, but will let it remain as decided by the Circuit Judges, through whose ruling on one ward meant the loss of the election.

The Saginaw United Transit Company asks only a three-year franchise and guarantees an eight-minute schedule on all routes now being served by it. This company wants a 5-cent cash fare and 2 cents for transfers. It proposes to incorporate for \$375,000 and will operate, if given the contract, sixtyfive, twenty and thirty-passenger buses.

The omnibus company offers a 6-cent cash fare and universal transfers. Its smallest vehicle is to seat at least twenty-five and Mr. Bidwell says that the company will use only thirtypassenger conveyances, such as the Imperial Omnibus in use on some New York routes.

It is believed that both the jitney men and street car-bus folks will oppose the omnibus grant. Those sponsoring the omnibus franchise have had their first meeting. Mr. Bidwell is reported to have said his company "would give as good or better service in Saginaw than the Fifth Avenue Coach Company, New York," if awarded the franchise.

Transit Measure Introduced at Albany

New Bill Gives City of New York Full Control of Transit-Present Commission Abolished-City Empowered to Acquire, Build and Operate All Transit Facilities—State Supervision Barred

THE Democratic administration at Albany chose Lincoln's birthday as the time to introduce its feature transit legislation emancipating New York City from the shackles of state regulation in so far as transit is concerned. The measure was introduced in the Senate by Majority Leader James J. Walker and in the Assembly by Minority Leader Charles D. Donohue. It is entitled:

An act granting to the city of New York power to construct, acquire, own, operate

and regulate transit facilities in such city. establishing the department of transporta-tion of such city, transferring to such de-partment and the Board of Estimate and Apportionment certain powers, duties and jurisdiction of the Public Service Commis-sion and of the Transit Commission, and abolishing the transit commission.

Instead of writing the provisions of transit regulation into the Greater New York charter, a new department of the city government will be established by a special act known as the Department of Transportation, which is to exercise supervision over all transit facilities located wholly within such

The act is divided into five articles and into it have been written the salient provisions of the public service commission law and the provisions of

the rapid transit act.

The feature provisions of the act are the broad grant of powers to the city, hereinafter more specifically stated; the provision that the commission shall not have power to increase any rate, fare or charge specified in any franchise heretofore or hereafter granted or contract entered into by or with the city; that the commission may prepare a plan or plans for municipal operation, which may be put into effect if approved by the Board of Estimate and Apportionment, and that any deficit in operation under any such plan or system shall be made up by appropriation out of funds of the city. The entire expense of the operation of such a commission is to be borne by the city of New York.

An official summary of the measure is as follows:

This act is a special city bill, applicable only to the city of New York, but is not an amendment to the charter.

Features of the Bill

THE bill deals exclusively with New York city, giving to it complete home rule in all transit matters.

The Board of Estimate is designated as the city authority to receive this power and to exercise it through a Department of Transportation, thereby created, or any other agency the board may choose

may choose.

The head of the department is to consist of three commissioners to be appointed by the Mayor, salary to be fixed by the Board of Estimate.

The city receives the following powers:

The city receives the following powers:

To construct, own and operate rapid transit lines (now contained in the rapid transit lines (now contained in the rapid transit act).

To regulate transit operation in the city (now exercised by the Transit Commission, which is abolished).

To construct, own and operate other means of transportation for which franchises are usually required. This includes, of course, buses, for which Mayor Hylan wishes to spend \$25,000,000. Freight may be carried by the municipally operated lines.

It is provided that in any municipal operation such activities and funds derived therefrom shall be kept separate from all other municipal activities and funds.

funds.

The act stipulates that fares shall not be increased to more than 5 cents, except by action of the Board of Estimate, which would have power also to reduce fares.

By the terms of the bill the city is given the largest measure of home rule in planning, building, acquiring and operating or lessing for operation transit facilities or any and every kind. The liberal of Estimate and Apportsonment is designated as "the local authority of the city in control of the stress for the purposes of exercising the breadest jurisdiction in all transportation matters.

DEPARTMENT OF TRANSPORTATION FOR NEW YORK CITY

DEFARTMENT OF TRANSISHTATION FOR New York a department of transportation, the head of which shall be a transportation commission composed of three commissioners to be appointed by the Mayor, and whose term of office shall end with the term of the Mayor, but the commissioners may be removed by the Mayor at his pleasure. The Mayor is also empowered to designate the chairman of the commission. The Board of Estimate and Apportionment is authorized to increase or decrease the number of commissioners at any time. No salary is fixed for the commissioners nor for any employees of the commission. The Board of Estimate and Apportionment is authorized to fix all salaries.

The present Transit Commission is abolished. All powers to overribe the Board of Estimate and Apportionment vested in the present Transit Commission are repeated and the new Transportation Commission will be subject to the Board of Estimate and Apportionment in all financial antents.

The introductory sections of the new act

particulars

Estimate and Apportionment in all financial particulars.

The introductory sections of the new act convey a grant of power to the city of New York, acting through the Board of Estimate and Apportionment or the Transportation Commission as specified, to establish, construct, install, own, acquire by purchase or condemnation, or control by lease, any railroads, street railroads, street aurface railroads, rapid transit lines, moving instruments or noibus or stage lines, trackless trolley lines, or any other transportation facility that would require a franchise to operate in the streets of the city. The city is also authorized to set up monicipal apportation facilities, or the Board of Estimate and Apportionment may lease any city owned transportation facility to a corporation to supervise and regulate the rates, fares, charges and practices of all corporations or persons owning, obtaining or operating any transportation facility within the city.

The Board of Estimate and Apportion—

tions or persons owning, obtaining or operstring any transportation facility within the
city.

The Board of Estimate and Apportionment is authorized to issue the obligations
of the city for the purposes of ownership
of transportation facilities, in the form of
transportation facilities bonds to be issued
for a period not longer than the estimated
duration and usefulness of the facility to
be financed by such means.

The jurisdiction of the department extends to all transportation facilities lying
exclusively within the city and to all transporstion facilities partly inside and partly
outside the city, so far as concerns the
operation of those lines within the city.

The commission will have power to prescribe rules and regulations to be observed
by all transportation corporations with
tespect to quantity or quality of service,
rates, fares and charges for carrying passengers and property, methods of accounting, financial reports, and all other powers
now vested in the Transit Commission or
the libible Service Commission to enforce
such regulations and orders such regulations and orders

CITY MAY USE ANY FORM OF TRANSPORTATION

TRANSPURTATION

The most important expansion of power occurs in broadening the field of monic put construction, acquisition and operation Heretofore, by the terms of the rapid transit act, the city has been authorised to construct only rapid transit railroads. The test transportation set authorizes the city occasion of test approach of the rapid transit of test approach of the article authorizing municipal construction and operation is developed in considerable detail. Parts of the rapid transit contract are included adapted to the media of the city including the prohibition against construction developed a proposed of the sections regarding the letting of construction contracts public hearings on contracts, and the aquisition of tailways parts completely new port on of the means of the sections regarding the letting of construction section of the research of the municipal operation action of the research.

parth completed. A completely new test on of the muni-pal operation section of the new get is testifying of financial control to be excu-ised by the Department of Transportation ever various forms of municipal operation

It is provided that the Department of Transportation may on its own initiative, and shall, at the direction of the Board of Estimate and Apportionment, make an investigation of the advisability of installing Beard investigation of the advisability of installing municipal operation of any form of transportation facility included in its jurisdiction, and that in reporting to the board it shall set up an estimate of the cost of construction, equipment or acquisition; an estimate of the cost of operation, including the personnel and organization that would be required; an estimate of the amount that will be required for maintenance and deprechation of the property and for interest and amortization of any city debt contracted to establish such transportation facility.

tracted to establish such transportacefacility.

The act provides that under municipal
operation the fare shall not be more than
5 cents, except by express authorization of
the Board of Estimate and Apportionment
1t is provided that the commission shall
prescribe the method of accounting and
that the operating agency of every transportation facility shall be required to make
monthly reports to the Mayor, the Comptroller, the Board of Estimate and Apportionment, and publish the same in the tify
Record.

tionment, and publish the same in the tity Record.

Out of the operating fund created it is required that, after the close of operations each month, there shall be paid into the city sinking fund the monthly proportion of interest and amortization chargenble on account of the city debt, and there shall be paid into a special fund, to be in the custody of the Comptroller a sum on account of depreciation of the property, to be used for renewal and replacement of worn out or obsolete parts.

SEPARATE ACCOUNTING FOR L'TILITIES

Another provision sets up a transportation contingent reserve fund in the custody of the Comptroller, into which will flow each month the surplus income remaining after all expenses and charges have been paid, except that the operating agency may retain an amount equivalent to the average expenses for one month as a working capital to meet the requirements and wages and supplies during the succeeding month. It is provided that if the operating income in any month should be sufficient to pay all the expenses of operation and maintenance, but not be sufficient to pay the contributions to depreciation, interest and sinking fund, such contributions may be deferred until the first month, when there shall be a sufficient operating income to make up the deficit, but all accounts must be closed at the end of the year, and any deficit in the amounts due for interest and amortization must then be paid out of the contingent reserve fund, if there be enough balance in that fund, or else supplied by the Board of Estimate and Apportionment out of tax levy.

The Intent and aim of the statute in

The Intent and aim of the statute in respect to municipal operation is to require that such enterprises be maintained entirely separate and distinct from all other activities of the city; that the funds derived from the operation shall not be merged with other income of the city, and that the couditions of operations shall be such that the public shall be fully and completely informed at all times respecting the progress and results of any municipal operation that may be carried on. The Intent and sim of the

Summarizing the bill as a whole. practically all of the powers conferred in respect to regulation are exercised at the present time by the Transit Commission, and formerly by the Public Service Commission of the First District. The powers in respect to construction and operation of rapid transit railroads are now vested in the Transit Commission and have descended from the old Board of Rapid Transit Commissioners. The new feature is the expansion of the power of the city in respect to municipal ownership and operation to include all other forms of transportation facilities in addition to rapid transit railroads.

No other acts are repealed. The Rapid Transit act remains, but the section of the Public Service Commission law establishing the Transit Commission will doubtless be amended and the provisions of this new act will supersede and take the place of any contradictory provision in any other act.

Preliminary Rapid Transit Plan

Downtown Subway Lines Are Pro-posed Under the Plan Recently Presented in Pittsburgh

Preliminary plans for a downtown subway in Pittsburgh, Pa., have been presented to Mayor Magee and Council by members of the sub-committee on transit of the Citizens' Committee on City Plan. The city authorities have \$6,000,000 available for a subway system, as the result of the people's bond election of a few years ago, and its early application to the comprehensive plan is now urged.

The plans are not yet complete, but with the completion of the entire transit report they will be published in full and amplified with supporting data. The plan is sufficiently advanced, it was stated, to warrant the attention of the Mayor and Council at this time.

Among the arguments offered in favor of the scheme are that it would diffuse traffic, shorten time between points and practically eliminate serious surface traffic conditions.

EARLY ACTION RECOMMENDED

The committee urges that the whole problem be given constant attention as its solution is vital to the growth of the city. The new plans are the result of more than a year of intensive study.

The plans are for a scheme to be developed in four stages, the final stage removing practically all surface cars from the downtown streets, and providing two "through" rapid transit lines, the first from the lower north side to the East End via Fifth Avenue and Oakland, the second from the south side through the triangle and out Penn Avenue to East Liberty.

Early action was recommended, however, only on the first stage of this plan-a stage involving the construction of two subway loops which, taking off the surface approximately one-half the cars now making use of the downtown streets and thereby greatly relieving the serious traffic congestion in the triangle, will later fit perfectly into the ultimate scheme of rapid transit.

In the preparation of the transit plan, members of the citizens' committee declared that their aim had been to suggest a scheme which would meet these

five requirements:

1. Afford the maximum relief from trafthe congestion.

2. Facilitate and fit into a final rapid

eft layout.

Spread the business district and theretransit

Improve transportation service,
 Passess the maximum of flexibility in

Preliminary Contract for Tokio Subway

The Foundation Company of New York, N. Y., has signed a preliminary contract for the construction of subways in Tokio, Japan, which on a cost-plus basis amounts to \$15,000,000. The contract provides for the construction of the first of three subway systems to cost about \$40,000,000.

Motorize Short-Haul Trolley

Plan of Railway to Use Buses Approved by City Authorities and Now Before Utilities Commission

Olneyville, R. I., a part of the city of Providence, has a flourishing business center that compares favorably with similar centers in many small cities. Olneyville Square is the center of activity, and trolley service from this point to the center of Providence is performed over Westminster Street and over Broadway, there being five-minute service over each of these thoroughfares.

On Broadway, two lines operate express between the center of Providence and Olneyville Square, in addition to the local five-minute service. Beyond Olneyville Square seven different trolley routes spread out in a fan shape.

The United Electric Railways, in its efforts to speed up transportation to the sections lying beyond Olneyville Square, is planning to operate most of these seven routes over Broadway express between the civic center of Providence and Olneyville Square, stopping only to take on passengers on outbound trips, and to discharge passengers on inward-bound trips. This action would cause all of the trolleys on Broadway to be express cars.

Broadway is a 50-ft. thoroughfare between curbs. It is paved with asphalt. The car tracks are in the middle of the street. This particular highway extends practically into the civic center of Providence, and affords a fine opportunity for bus operation. The corner of Barton Street and Broadway is the last stopping place in an out-bound direction before reaching Olneyville Square.

With all the trolleys running express, the United Electric Railways is now planning to operate buses between Exchange Place, in the civic center of Providence, and the corner of Barton Street and Broadway on five-minute headway during the entire day and evening, and every 2½ minutes during the rush hour periods, if the travel supports it. This schedule will call for the operation of five buses during the normal periods and ten buses during the peak periods.

The distance between Barton Street and Exchange Place is 1.52 miles, and the trip will be made in twelve minutes. Thus, all the people within the area between Barton Street and the center of Providence will be served entirely by motor buses in lieu of trolley service.

The buses to be used will be of a seating capacity of twenty-four or twenty-five persons each. They will not be purchased until the Public Utilities Commission has approved of the plan to run them.

The method of fare collection will be pay-as-you-enter in-bound, and pay-as-you-leave out-bound. Operators will use the Rooke Automatic registers, which are capable of taking either the new metal fare tickets now in use, or a 5-cent piece accompanied by a cent paid into the hand of the operator. By the

former method, there is a saving of 20 per cent over the latter procedure, the only requirement being the purchase of ten of these metal tickets for 50 cents. The same transfer privilege as prevails on the trolley cars, the purchase of one for 2 cents, will be in effect with the bus operation.

The plan was first presented by the United Electric Railways to the railroad committee of the Providence City Council and approved by it. Under the Rhode Island laws, it is necessary, before such changes can be put into operation, to have the approval and consent of the State Public Utilities Commission, and the plan is now in the hands of the commission. Providence, however, anticipates seeing motorized service in operation soon.

The United Electric Railways at the present time is operating five bus routes, four of them being to suburban points, and one being a cross-city line, operating between South Providence and Olneyville, across residential areas, and not through the civic center.

The present bus equipment of the company consists of seventeen units, as follows: Six Republic, six Mack and five White buses.

Fate of One-Man Cars Up

One-man cars in Clarksburg, W. Va., are doomed after Feb. 15 if an emergency ordinance passed by the City Council stands. The action by the Council followed quickly after announcement was made by the Monongahela Power & Railway Company that one-man cars would be placed on the Norwood line in addition to Adamston, Stealey and Despard runs.

The ordinance as passed declares that "one-man" cars are dangerous, provides that the city manager shall notify the company of the passage of the measure and establishes a penalty of not less than \$50 and not more than \$100 a car for each day it is violated after it takes effect Feb. 15.

In placing the ordinance before the Council for consideration, Councilman Bailey bemoaned the fact that there is a lack of competition among public utilities in Clarksburg and declared it was within the province of the Council to determine the nature and quantity of service which must be supplied by the utility companies.

District Commission Replies to Its Accusers

The Public Utilities Commission of the District of Columbia does not believe that a merger of the street railway companies, long advocated as a cure for Washington's traction problems, would of itself result in a reduction in farc. The commission voiced this belief in a voluminous letter mailed to Senator Phipps of Colorado, in which the Commissioners replied in detail to attacks made upon them recently on the floor of the Senate for the rates they have fixed for utilities. Even without a merger Congress could bring about a

reduction in car fare, the letter declared, by changing the method of taxing the car lines, which legislation has been advocated by the commission for several years. The commission told Senator Phipps that with coal going up and no indication of a break in other operating expenses, there is little hope for a cut in fares without the long-pending legislation to change the form of taxation and to relieve the companies from paying the salaries of crossing policemen and paying track spaces.

Relief from Congestion Urgent in Detroit

Tentative plans for a system of down town dips or short subways to relieve congestion in the center of the city of Detroit will probably be ready within thirty days as a result of a meeting of the city's Rapid Transit Commission and the Street Railway Commission called by John C. Lodge, the city's acting Mayor. The meeting was attended by the full membership of both commissions. It was called at the suggestion of Ross Schram, assistant general manager of the Detroit Municipal Railway. The railway commission is at work on a program for immediate relief of congestion in the down town section which provides for submerging some of the lines and possibly leaving some on the surface. This plan according to Mr. Schram will be ready for consideration by the Council within thirty days.

The Rapid Transit Commission, on the other hand, has been working along a different line. It is considering a permanent rapid transit program to handle eventually a population of 3,000,000 people. The Rapid Transit Commission is of the opinion that construction of subways on the piecemeal plan may later prove very expensive to the city as some of the lines so built may possibly have to be rebuilt in the light of a more complete study of the city's transportation needs.

On its part, the Street Railway Commission contends that a program such as the Rapid Transit Commission proposes would require two years of planning. Meanwhile congestion in the down town section is becoming intolerable. Officials of the D. S. R. favor work being started at once on short down town dips, to be used later as a down town terminal and loading station for the unified rapid transit lines.

No detailed estimate of the cost of the dips has been made by the D. S. R. Although the Rapid Transit Commission favors delay, Sidney D. Waldron, chairman of that body, has signified willingness to co-operate with the street railway department in developing plans for relieving congestion as early as possible. A meeting of the members of the Rapid Transit Commission with the members of the Street Railway Commission and with D. L. Turner, consultant engineer for the Rapid Transit Commission, will probably be held within the next few days to endeavor to hit upon a common plan if possible.

First Bus Application Allowed

Commission Having Jurisdiction in New York City Grants Operating Right to Far Rockaway Line

The New York Transit Commission has granted to the Nassau Bus Line, Inc., Paul M. Weidman president, a certificate of convenience and necessity permitting the operation of a bus line from Far Rockaway easterly to the New York city line at Central and McNeil Avenues, Lawrence. This company applied to the Board of Estimate and Apportionment for a franchise on Nov. 3 last. The franchise was granted with the subsequent approval of the Mayor on Jan. 9. It had previously secured from the Nassau County authorities the right to operate from the city line easterly to Lynbrook, so that the complete line now legalized and open to public use will be from Lynbrook to Far Rockaway.

This is the first application received by the Transit Commission for permismission to operate a bus line under a franchise legally granted by the city since its appointment nearly two years ago and the franchise is the first granted by the Board of Estimate since the decision of Justice Mullen of the Supreme Court, handed down in October, holding operation carried on merely under permits issued by the Commissioner of Plant and Structures to be invalid. The commission announced some time ago that it would be its policy to consider and determine every bus line application that would come to it, within the shortest possible time. It, accordingly, held a hearing on the Nassau application on Feb. 6 and issued its certificate within ten days of the granting of the franchise by the Board of Estimate. Under the law, the Board of Estimate, in granting a franchise, determines what route over city streets the operating company may use, and also what it shall pay to the city for its franchise privileges. The certificate of the Transit Commission, which cannot be given until the Board of Entimate has acted, but which is essential to complete the operating company's authority, covers the question of the public need for such a route.

The commission, at the time of the public hearings on the general subject which it held in October and November announced its readiness to grant certificates to practically all of the business lacking franchises and held up by the court, but the Board of Estimate has not as yet acted finally in the case of any of these, other than the Nassau line. The action of that body in this case, however, apparently fixes a precedent upon which other lines still in operation without legal authority may be validated in similar manner.

The Nassau company now runs its huses only from Lynbrook to the city line, but formerly operated to Far Rockaway. Its use of the part of this route within the city was halted by injunction. It will now be able to re-

sume operation over its full route, without interruption, and it is understood will do so within the next few days. It is to pay to the city by way of compensation for its franchise privileges 5 per cent of its gross receipts. Formerly it paid nothing.

Commission Asked to Make One-Man Car Decision

The Alabama Public Service Commission will be asked to decide whether or not the Birmingham Railway, Light & Power Company will be allowed to continue the operation of its one-man cars on the Norwood and Fountain Heights lines. This announcement was recently made by City Commissioner William L. Harrison.

Many citizens of Norwood and Fountain Heights filed objections to the oneman cars on the grounds that they had but one entrance for both whites and negroes. The matter was taken up and discussed thoroughly a few days ago by Lee Bradley, receiver of the street car company, and Judge W. I. Grubb, of the United States court, and their decision at the time was that the company was not financially able to make the change. which they estimated would cost the company approximately \$180,000, including the loss on the sale of the oneman cars at second hand prices and the purchase of double entry cars.

Governor Refuses to Intervene in Strike

Any attempt on the part of State Industrial Commissioner Bernard L. Shientag to investigate the causes of the strike on the International Railway in effect since July 2 would be nothing more than an "empty gesture." This is the opinion of Governor Smith. He so stated on Feb. 14 to John M. Parker. president of the street railway men's union, who, with President James P. Holland of the State Federation of Labor and representatives of a dozen railway unions throughout the State. called on him in an effort to secure the services of the bureau of mediation and arbitration of the state industrial commission.

The Governor met the labor representatives in the executive chamber by appointment and listened while President Parker outlined their wishes as covered in resolutions which were handed the executive.

"Commissioner Shientag," said the Governor, "has been in office less than two weeks and during that time has been detained in New York in an effort to adjust the strike of the garment workers. Moreover, he found his department standing on its head and in need of thorough reorganization. He expects to apply himself to the task at once and for that purpose will be in Albany tomorrow.

"I expect to see him and will bring your matter to his attention, but it is only fair to you men to tell you I think any investigation he might make would be nothing more than an empty gesture.

"I've gone over this whole situation with the dominating powers in the International Railway and I know exactly how they feel. I don't mind telling you what they told me, and that was that before they would consent to arbitrate this question with your union they would turn the entire company over to the men who are now running it. That's how strong they feel about it. It's useless to talk about arbitration when one side or the other takes the stand that there is nothing to arbitrate. There is no law in this State which can force arbitration when one side or the other refuses to entertain it.

And then, warming up a bit, the Governor demanded:

"How in hell can you arbitrate something which one side won't admit exists? And these men mean what they tell me, I'm satisfied of that."

News Notes

Paving Bill in Indiana.—The Indiana House has adopted a committee report for a bill which would provide for paving between street car tracks. The bill provides that intertrack paving shall be paid for by the abutting property owners, but that if special paving be required, or if the paving costs more than the regular paving outside the tracks, the company shall pay the excess cost.

Could Not Be Financed.—In commenting on the city's suggestion that the Northern Ohio Traction & Light Company, Akron, Ohio, accept a ten-year franchise which provides for a capital expenditure during that time of \$2,000,000, the N. O. T. & L. News, the official publication of the company, states under date of Feb. 2 that the suggestion cannot be accepted. The reason given is that it would be utterly impossible to obtain this amount of money in Akron or any financial center to be invested in new lines under a grant which only runs for ten years.

Municipal Ownership Bill Introduced. The latest bill to be introduced in the Indiana General Assembly would curtail the authority of the Public Service Commission and permit municipal corporations to establish utilities where privately owned utilities already exist, without appealing to the Public Service Commission for permission. The bill does not mention the fixing of rates, leaving that to the Public Service Commission. A bill introduced previously included the same provision, but also would permit the municipalities to fix rates without interference from the commission. This was considered a serious blow to the authority of the commission, as it was said privately owned utilities could not compete with those owned by the public when the municipality fixed the rates.

Foreign News

Renewal Work in Hand

Reductions in Cost of Material and in Wages Paid Spurs New Work-Many New Fares Put Into Effect on Jan. 1-Car Without Angles Ready for Service

of British tramway authorities are now putting in hand track renewals which are not merely urgently needed but are long overdue. Besides that, authorized extensions are soon to be constructed. The promises of a revival in trade are producing a certain feeling of optimism. anl if the trade prospects go on improving there will be a revival in tramway construction. Traffic receipts are showing a smaller reduction compared with corresponding weeks of twelve months ago, and in the case of the London County Council the corner has already been definitely turned, the receipts in the last few weeks showing substantial increases compared with those of the same weeks of a year ago.

RAILWAY FARES REDUCED

The promised reduction of railway fares all over Great Britain came into operation on Jan. 1. Third-class fares are 12d. per mile instead of 13d., and first-class fares 24d, instead of 3d. On the London underground electric railways, which are in a class by themselves and not bound by any arrangements for the railways of the country generally, the minimum fare for the shortest journey which can be taken remains at 11d. For all longer distances, however, fares are so reduced as to average 1d. a mile and in some cases even less. Then, while general railways of the country have made no change in season ticket charges, "the Underground" has reduced season ticket rates also.

On the tramway lines and omnibuses associated with "the Underground" the penny stage has been increased from half a mile to a mile, with a penny a mile for longer distances. The object of retaining the 11d. minimum on the railways is to induce passengers to use the buses for short distance travel. On the London County Tramways the fare for slightly over a mile was already a penny, and this has not been altered. The distance for a penny during the slack midday hours has, however, been increased from 1.2 to 1.8 miles. All the concessions which have been made in the line of reductions in fares are in hope of traffic responding sufficiently to prevent loss.

POWER PLANT IMPROVEMENTS PROPOSED

Large additions to electric generating plants were installed at Liverpool and Leicester during December. In the municipal power station of the former city a 12,500-kw. generator was started

OWING to the fall in the cost of and an automatic substation, the first of labor and materials a large number the sort in this country, was opened. The new generator, if used for tramway power alone, could operate a tramway system three times the size of that in Liverpool, but the municipality supplies electricity for all purposes within the city. In Leicester a new municipal power station was opened, with one unit of 10,000 kw. installed. Extensions can be added on a uniform plan up to a total of 65,000 kw.

> One of the five improved experimental cars ordered some time ago by the London Electric Railway from five British firms has now been completed or almost so. This has been built by Commell, Laird & Company. Angles have been avoided everywhere, and the wheels are surmounted by leather shrouds so as to deaden the noise in the tunnels. The lighting is elaborate. Those lamps which show have cut-glass globes, while the others are so concealed as to avoid a glare in the eyes. The internal fittings are luxurious, with royal blue and ivory as the principal decorative colors. The same blue and old gold characterizes the upholstery.

CAR SPEEDS ATTRACT ATTENTION

In tramway circles a renewed interest is being taken in the question of car speeds, and it is claimed that present restrictions should be relaxed. When they were first instituted there were no automobile vehicles, and the enormous speed not permitted to the latter has accustomed the public to high-velocity road traffic. It is accordingly contended that the cast-iron rules relating to tramcars should be modified. They have often to compete with motor buses and they have to stop more frequently than the latter. That something can be done even within the present regulations is shown by a sensible speeding up of London tramcars on many routes. In fact, the acceleration and braking are so rapid as sometimes to be of inconvenience to passengers who are not seated at the moment.

The National Joint Council for the Tramway Industry entered on its fourth year of existence in December. At a meeting of the Council on Dec. 14 a special committee was appointed to report on the most suitable type or types of vestibule fronts on tramcars now in service and the measures that may be taken to secure their general adoption. During its existence the Council has been very successful in deciding disputes and preventing strikes.

The one-man car is, of course, a great institution in the United States, but in this country it has so far been experi-

mented with on only a very small scale. The attention of the Ministry of Transport has, however, been directed to it and the Ministry has issued regulations to be observed. The regulations are substantially in accordance with American practice, as, for example that the car should be a single-decker, that the entrance and exit should be by a door at the front on the near side with folding step working in conjunction with the door, and the car should be incapable of being started until the door is shut.

In the middle of January "no accident week" was observed in Glasgow under the auspices of the Town Council Safety First Committee. All the ministers of religion in the city were asked to make reference on Sunday, Jan. 14, to the Teachers were requested to matter. address their scholars on the subject of "safety first," and the scholars got "safety first" buttons to wear. Safety first pennants were sent to drivers of vehicles for display during the week. Various organizations of juveniles took part in the general effort.

RAIL CONTRACT AWARDED

Edinburgh Town Council, reversing a decision of its tramways committee, has awarded a contract for 2,500 tons of rails to Dorman, Long & Son, Middlesbrough, at £9 9s. per ton. The committee had proposed that an offer should be accepted from the Compagnie Anglo-Belge d'Importation & Export, Brussels, at £7 15s. per ton. The desire of the majority of the Council is to encourage home industry and to relieve unemployment.

The conjoint stations at Charing Cross of the Metropolitan District Railway, the Charing Cross & Hampstead Railway and the Baker Street & Waterloo Railway have established a new record. During the busy time of the day 1,232 cars (run of course in trains) pass through every hour, with seating accommodation for 61,600 passengers. Between 5 and 6 o'clock in the evening more than 200 trains pass through

The London County Council has decided that in future the cost of renewing track shall be charged as renewals, and that all patch work in connection with paving and the making good of broken rails and castings shall be charged as

The Town Council of Croydon, a large borough on the southern outskirts of London, has for a few years been in financial trouble over its tramway system, largely owing to the competition of London motor buses. It has now been decided to undertake the reconstruction of the main road track by direct labor, instead of employing contractors. The estimated cost is £132,000.

The work of constructing a tramway across the high-level bridge between Newcastle-on-Tyne and Gateshead has now been completed, and a great convenience to the local public is assured. The scheme has been talked about for many years. Cars will be run over the structure at one-minute intervals in each direction.

Financial and Corporate

Interurban Does Well

\$10.91 a Share Earned by the Detroit United Railway Since Divested of City Lines

The report of the Detroit (Mich.) United Railway for the year ended Dec. 31, 1922, shows a net income of \$1,677,-875 after interest charges, federal taxes and contingent liability reserve. This is equivalent to \$10.91 a share earned on \$15,375,000 capital stock and compares with a net income of \$865,444, or \$5.62 earned in the previous year.

The consolidated income account of the company for the year 1922 compares as follows:

STATEMENT OF EARNINGS OF DETROIT UNITED RAILWAY

	1922	1921
Operating expenses		\$23,329,067 19,428,779
Net carnings Other income	\$3.046,242 1,064,574	\$3,900,255 716,225
Total Income Interest, taxes, etc.		\$4,516,513 3,601.060
Net income Dividents and federa	a.1	\$1,015,453
far .	356,161	*825,000
Surplus .	\$1,323,411	\$150,111

^{*}Includes \$375,000 paid in stock,

The statement reflects, of course, the changed status of the company following the transfer by it of its city lines to the city of Detroit for municipal opera-The sale price to the city was \$19,850,000, \$2,770,000 of which was to be paid in cash. This price, after deducting the cash payment which was utilized for discharging other obligations of the company, was a little more than sufficient to provide for the company's bonds allocated to the city system.

ENTRANCE TO DOWNTOWN DETROIT ESSENTIAL

As to the prospects for the future, acting President Elliott Stevenson says that the company is still faced with problems of a serious character. The era of so-called good roads has resulted in the construction of many miles of so-called concrete pavement in Michigan paralleling the company's interurban This has resulted in intense avstem. competition by carriers of passengers and express and light freight for hire by Individuals and companies putting into service buses and trucks. All this has tended to diminish the company's traffic. Another problem is to secure better means than now exist for providing more rapid delivery of suburban passengers to the center of Detroit.

The city of Detroit, Mr. Stevenson says, no doubt will at an early date take steps to establish rapid transit facilities for its own traffic and that these are likely to take the form of subways rather than an elevated. It will be a matter of vital Importance to

the Detroit United Railway to arrange to avail itself of the rapid transit facilities when provided, in order that the growing suburban traffic may be encouraged and properly served. He exexplained that a general survey of the situation has been undertaken by the city authorities and that his own contpany has independently undertaken a similar survey, as it is generally recognized that such facilities should be provided at an early date.

So far as the dividend record of the company goes, it resumed the payment of cash dividends by the declaration of 11 per cent on Dec. 1. Two stock dividends at the rate of 21 per cent quarterly were voted by the directors, payable Sept. 1 and Dec. 1, 1921, subject to the approval of the Public Utilities Commission. The commission in both instances withheld approval so that the action of the directors proved ineffec-live, and as a result the resolutions were rescinded declaring the dividend referred to, payable Sept. 1 and Dec. 1.

Reorganization Terms Announced

Underlying Securities of Brooklyn Rapid Transit Will Remain Undisturbed—\$26,000,000 of New Capital to Be Provided—Financial Structure Rearranged to Include Preferred Stock Issue

UDGE JULIUS M. MAYER of the United States Circuit Court at New York late on Feb. 9 announced the terms of the reorganization plan prepared by the committee of stockholders and agreed to by a large majority of the other security holders of the company. This is the first legal step toward the teorganization of the company and its release from receivership. The proposed reorganization is intended to accomplish:

The early termination of the receiver-

2. The funding into long-term 6 per cent bonds of more than \$60,000,000 of short-term obligations, most of which new curry per cent interest.

The payment in part, and the adjustment of the balance, of the accumulated arrears of interest, amounting to more than \$27,009,000 on the bonded debt of the system so as to permit the resumption of the layment of current interest.

The novment in each of the principal

1 The payment in each of the principal amount of the tort claims for personal injuries, as allowed estimated at approximately \$2,200,000

imately \$2,200,000.

5 The adjustment of the ciaims of the general contract creditors, as aboved, estimated at approximately \$1,500,000.

6. The payment of receiver's certificates and other claims against the properties asgregating more than \$17,000,000.

7 The provision of \$26,000,000 of new mode) by stockholders or underwriters for the purposes of the reorganization. This includes, in addition to the above cash regularements, the immediate provision of a requirements of the rapid transit lines among which is the equipment of the lines still to be completed by the city under the existing contract, and the provision of working capital.

The plan as proposed does not include the surface lines of the Brooklyn City Railroad, but provision has been made for their inclusion later if an agreement on terms can be reached. Underlying bonds of the approximate value of \$46,500,000 are not disturbed by the plan.

Announcement of the plan was made by Judge Mayer after application had been made by the receiver for permission to issue additional receiver's certificates. Judge Mayer said that he did not believe it would be necessary to pass upon this at present. Judge Mayer said:

The task of working out a plan of such magnitude has been one of great difficulty in a very compilested situation in which there are many different kinds of securities and claims. After months of study and of conferences the negotiations have reached a

point when it may be announced that the notcholders' committee, War Finance Corporation and the stockholders' committee, as well as substantially all of the other committees of security holders, have reached an agreement as to the main features, leaving only to be worked out the details, which are inherent in every important plan of reorganization.

It is gratifying to state that the plan, among other things, contemplates and provides for the payment of 100 per cent of the principal of the tort claims in cash, it will be recalled that at the beginning of the receivership, when Lindley M. Garrison was appointed permanent receiver, the court expressed its purpose to do all within its power to accomplish this result and counsel for certain of the security holders, then present, assured the court of their co-operation in that regard. That co-operation has been faithfully tendered with the result indicated.

In due course the receiver will present a report of the affairs of the receiverships. This will show, among other things, the completion during the receivership of the R. R. T.'s part of Contract No. 4 entered into with the city in 1913. During the receivership the new tunnel under the East River has been fully equipped and placed in operation in conjunction with the line runoing up Broadway, Manhattan and the Hrighton Beach subway connection, and other new lines in the Borough of Brooklyn the same period 400 new steel passenger cars of the latest type have been provided for use in the subways, and in addition to other improved facilities on the rapid transit lines many miles of surface rallway track have been reconstructed and new cars hought and put into service.

Notwithstanding these and other desirable results, those familiar with legal procedure will appreciate that, under the limitations of a receivership, this great system of transportation cannot reach its fullest procedure will appreciate that, under the limitations of a receivership, this great system of transportation cannot reach its fullest procedu

The court then explained that in accordance with the law it will be necessary to submit the plan to the Transit Commission for approval, but that the commission had been informed of the steps taken and that it was well disposed toward reaching a final settlement of the questions involved.

NEW SECURITIES

New securities proposed to be issued under the plan include the following:

1. New 8 per cent sinking fund bonds, to be secured by the pledge, at the rate of six for five, of 5 per cent bonds of the company or companies owning and operating the rapid transit subway and elevated lines and the power house properties. Peniling the creation of these underlying bonds, the security will be all or substantially all of the capital stock and obligations of the companies at the time owning and operating the rapid transit subway and elevated lines and the power house properties. The new 6 per cent bonds are to mature in approx-

imately forty-five years and arc to carry cumulative sinking fund payments, begin-ning July 1, 1926. 2. New 6 per cent preferred stock, cumu-lative after three years. 3. New common stock, without par value.

PRIOR LIEN MORTGAGE PROPOSED ON RAPID TRANSIT LINES.

The proposed plan also contemplates the authorization of a prior lien mortgage on the rapid transit lines and power house properties to such an authorized amount as may be later determined by agreement with the committee. Bonds are to be issuable hereafter under this mortgage for the purpose of providing additional equipment and for capital improvements for the rapid transit lines and for the power house properties after July 1, 1923, and after the exhaustion of the funds provided for such purpose in reorganization.
The authorization of this prior lien mortgage is intended to make certain that the new company will at all times be in a position to finance the requirements of its contract with the city. None of these bonds will be issued under the plan. It is also contemplated that the entire investment of the new company in the surface railway companies will be available hereafter for the future financing of the surface railway properties.

Holders of the \$74,422,959 par value of stock of the Brooklyn Rapid Transit Company outstanding will have the privilege of purchasing, for the aggregate purchase price of \$26,048,015, \$16,280,009 face amount of new 6 per cent bonds of the issue above described and \$9,768,006 par value of new 6 per cent preferred stock and 744,229 shares of new common stock without nominal or par value. The payment by stockholders for this purpose amounts to \$35 per share.

Under the proposed plan, each stockholder on the payment of \$35 for each share of old stock deposited will be entitled to receive on consummation of the reorganization \$21.875 face amount of new 6 per cent bonds, \$13.125 par value of new 6 per cent preferred stock, and one share of new common stock of successor corporation organized to acquire under foreclosure properties of Brooklyn Rapid Transit Company.

Terms proposed to be offered for the readjustment of the notes and bonds of Brooklyn Rapid Transit Company outstanding in the hands of the public by the issuance of new 6 per cent bonds and new 6 per cent preferred stock, and the cash payments to be made, are as follows:

Three-year 7 per cent notes: \$1,100 new 6 per cent bonds; \$180 new 6 per cent preferred stock; \$70 cash.

Six-year 5 per cent notes and New York Municipal Corporation 5 per cent bonds: \$1,100 new 6 per cent bonds; \$100 new 6 per cent preferred stock; \$50 cash.

Fifty-year 5 per cent bonds, due 1945: \$900 new 6 per cent bonds; \$125 new 6 per cent preferred stock; 1,625 shares new common stock; \$50 cash.

Refunding mortgage 4 per cent bonds: \$720 new 6 per cent bonds; \$100 new 6 per cent preferred stock; 3.2 shares new common stock; \$40 cash.

Secured bank loans: 47 per cent of principal and arrears of interest to June 30, 1923, in cash, 47 per cent thereof in new 6 per cent bonds and the remaining 6 per cent thereof in new 6 per cent preferred stock. In each of these cases the amount of new securities or cash mentioned is the amount applicable to \$1,000 face amount of obligations, every bond to carry all defaulted coupons.

As indicated previously the principal amount of claims arising out of the Malbone Street accident and other unpaid tort claims are to be paid in cash. General contract claims aggregating \$1,500,000 are to be satisfied by receipt of 50 per cent of principal of claims in eash, and the balance, including interest. is to be satisfied by the receipt of new 6 per cent preferred stock. The Wall Street Journal has worked out the accompanying summary of the reorganization terms.

--To Receive-

PLAN OF READJUSTMENT OF BROOKLYN RAPID TRANSIT COMPANY Existing securities and claims to be readjusted: Amount

Hansid

77,000 initias						
Per \$1,000 bonds. First consolidated mortgage 5 per cent gold bonds. Per \$1,000 bonds.	2,803,000 1,000	560,600 200	2,803,000 1,000	420,450		140,150 50
*Brooklyn, Queens County & Suburban Railroad Company: First mortgage 5 per cent gold bonds	1,497,000	336,825 225	1,497,000 1,000			336,825 225
Coney Island & Brooklyn Italiroad Company: Consoli dated mortgage fifty-year 4 per cent gold bonds Per \$1,000 bonds	1,500,000 1,000	270,000 180	1,500,000 1,000			270,000 180
Per \$1,000 bonds. Consolidated mortgage 4 per cent gold bonda Per \$1,000 bonds.	10,337,000 1,000	1,860,660 180	10,337,000 1,000			413,480
First mortgage 5 per cent gold bonds	660,000 1,000	132,000	660,000 1,000			132,000 200 413,480
Forty-year 5 per cent improved gold bonds Per \$1,000 bonds Nassau Electric Railroad Company:	215,000 1,000	43,000 200	215,000 1,000			200
General mortgage 5 per cent gold bonds. Per \$1,000 bonds. Atlantic Avenue Railroad Company of Brooklyn:	1,000	200	1,000			200 43,000
Underlying bonds to be rejostated: Brooklyn, Bath & West End Railroad Company:	118.928	23.796	Bonds of Issue Deposited 118.928	6 per Cent Preferred Stock	eceive	Cash 23.796
	\$164,327,659 Cash	\$24,329,737 paid in by stoc	\$92,761,007 kholders, \$26,	048,015, or \$3,50	00 per 100 shar	\$22,045,497 es.
Per 100 shares			2,187			422.045.407
Receiver's certificate and car leases warrant B. R. T. stock on payment of \$35 per share	12,485,000 74,422,959	†	16,280,009	9,768,006	744,229	12,485,000
*Tort claims for personal injuries (estimated) *Claims of general contract creditors (estimated)	2,200,000 1,500,000	400,000	(47 per cent)	FEBRUARIE		2,200,000 750,000
Brooklyn Rapid Transit Co.: Bank loans secured by its 4 per cent refunding bonds	3,300,000	937,166	1,991,468 (47 per cent)	254,230 (6 per cent)		1,991,468 (47 per cent)
Brooklyn Heights Railroad Co.: First mortgage 5 per cent gold bonds. Per \$1,000 honds.	250,000 1,000	53,125 212		250,000 1,000		
First mortgage 5 per cent sinking fund gold bonds Per \$1,000 bonds.	2,055,000 1,000	513,750 250	2,260,500 1,100			102,750 50
Six-year 5 per cent secured gold notes due 1918. Per \$1,000 notes. New York Municipal Railway Corporation:	475,000 1,000	118,750 25 0	522,500 1,100			23,750 50
Per \$1,000 bonds. Three-year 7 per cent secured gold notes, due 1921. Per \$1,000 notes.	57,243,700 1,000	20,035, 2 95 350	62,968,070 1,100	10,303,866 180		4,007,059 70
Per \$1,000 bonds. First refunding mortgage, 4 per cent gold bonda.	3,433,000 1,000	617,940 180	900 2,471,760 720	343,300	10,986 3	625 50 137,320 2 40
Brooklyn Rapid Transit Company: 5 per cent fifty-year gold mortgage bonds	\$6,963,000	\$1,653,712	\$6,266,700		11,315	\$348,150
	Held by Public	Interest to July 1, 1923	New 6 per Cent Bonds	6 per Cent Preferred Stock	Common Stock (Shares)	$\begin{array}{c} \textbf{Casb} \\ \textbf{Received} \end{array}$

^{*}The right is expressly reserved to exclude from treatment under the plan or to postpone the read-justment of any bonds or other securities of or claims against Brooklyn, Queens County & Suburban Railroad Company in case an adjustment of existing

controversies affecting the stock or bonds of said company is not reached with the Brooklyo City Railroad Company † Interest on these obligations is not here included, as same is paid currently by the receiver.

Unpaid interest on underlying bonds is computed to July 1, 1923, if an interest date: other nearest interest date preceding said date.

P. R. T. Valuation Case Nearing Completion

At the hearing on Feb. 5 in connection with the proceedings to establish a valuation for the property of the Philadelphia Rapid Transit Company, in answer to a question by Commissioner Clement of the Public Service Commission, Attorney Coleman J. Joyce of the railway said he would require sixty hours in which to complete crossexamination of witnesses and finish the company's side. Assistant City Solicitor Rosenbaum agreed to this length of time and announced that he would need about three weeks to complete the city's side of the proceedings. Commissioner Clement announced that daily hearings would be held, except on Saturdays and Sundays, and allotted three hours a day to Attorney Joyce. Under this arrangement, the case is expected to be completed and all testimony submitted to the commission for its consideration by March 26.

Lima-Defiance Branch Sold

Agreement for sale of the Lima-Defiance branch of the Columbus, Indiana & Eastern Traction Company to C. G. Taylor, Norwalk, Ohio, was concluded on Jan. 31, according to an announcement by Receiver J. H. McClure. The price agreed on was the upset price of \$125,000 fixed by Federal Judge Killits of Toledo, for the sale of the road as junk or as an operating concern. Because of this, confirmation of the sale was a mere matter of form.

Under the terms of the agreement, the purchaser paid \$12,500 as a binder, the remainder to be paid by April 1. In the meantime, the L., C. & E. is to continue operation of the branch. Should the purchaser fail to carry out his part of the contract in paying over the remainder of the purchase price, the amount of the binder will be returned to him less any deficit incurred in the operation of the branch line between Feb. 1 and April 1. Any such deficit, if incurred, is also to be added to the balance due on the purchase price if the purchaser completes his agreement.

Mr. Taylor contemplates operation of the branch line with gasoline motor cars instead of electric power. The branch is one of three which the company was authorized to abandon, but on which operation was continued during negotiations between Mr. Taylor and the company for its purchase.

Mr. Taylor proposes to form a new corporation and issue \$250,000 in stocks and bonds to finance his venture. This amount would be divided into \$175,000 of first mortgage bonds and \$75,000 preferred stock. There would be no common, the preferred stock having voting power. He proposes to sell the stock to farmers and residents of villages along the line, and is said to have received considerable encouragement from those who wish to keep the line in operation

Continuation of operation on the Lima-Defiance line will have a beneficial effect on the Indiana, Columbus & Eastern line, inasmuch as connections between the two will still be maintained although it will be necessary for passengers to transfer at Lima.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Another Dividend Declared. — The board of directors of the Brooklyn (N. Y.) City Railroad has declared a regular quarterly dividend of 20 cents per share on the outstanding capital stock, payable March 1, 1923, to stockholders of record on Feb. 15, 1923.

Takes Mortgage for Bonds.—The Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., has been mortgaged to the Fletcher American National Bank, Indianapolis, as trustee, to secure the issuance of \$973,000 of first mortgage twenty-fiveyear bonds. According to the mortgage, the board of directors and stockholders decided to borrow money for corporate purchases.

Initial Common Dividend Declared.— The Georgia Railway & Power Company, Atlanta, Ga., has declared an initial dividend of 1 per cent on the common stock, payable on March 1, and an initial dividend of 4 per cent on the second preferred stock, payable in quarterly instalments of 1 per cent beginning March 1. The regular quarterly dividend of 2 per cent on the first preferred has been declared payable April 20.

Portions of Properties Transferred.—
The Toronto & York Radial Railway and the Schomberg & Aurora Railway have been purchased by the city of Toronto and by agreement the portions of the railways outside the city of Toronto have been turned over to the Hydro-Electric Power Commission of Ontario to operate. The portion of these railways within the city are now being operated by the Toronto Transportation Commission.

Deficit Reported.—The income statement of the Springfield (Ohio) Street Railway for the entire year of 1922, filed recently, showed a deficit of \$38,766, not including \$30,000 accrued dividends on the preferred stock for which no provision was made. The annual report showed that in 1922 the company had carried a total of 9,131,974 passengers, with revenue from transportation aggregating \$590,508 and non-transportation income of \$5,209. Other income totaled \$988,

Monthly Appears.—Nesbitt, Thomson & Company, Ltd., investment bankers of Montreal, Que., is issuing a monthly known as "Investments." The first issue presented a concise, easily read compilation of bond prices both in 1921 and 1922. Separate tables were also published, showing war loans, victory bonds, provincial, public utility and industrial bonds, giving the maturity date, interest date and yield, as well as the

high and low and the net change during 1922. This publication will probably prove of real value to the investor.

Slight Decrease in Net.—The Reading Transit & Light Company, Reading, Pa., and subsidiary companies report a decrease in operating revenue, total operating expenses and net income for the year ended Dec. 31, 1922, compared with the year previous. The net income for the year just ended amounted to \$240,748 against \$247,285 for 1921. The provision for preferred stock dividend in 1922 was \$117,115 which left a balance of net equaling \$123,633 against \$130,170 for the year ended Dec. 31, 1921.

Railroad to Acquire Lighting Properties.—The Annapolis Public Utilities has applied to the Public Service Commission of Maryland for permission to change its capitalization to pave the way for the acquisition of various electric lighting companies between Baltimore and Washington, and the new issues will be used in part, it is said, to pay for these properties. The properties to be acquired lie along the line of the Washington, Baltimore & Annapolis Railroad, which owns \$172,700 of the \$300,000 of common stock of the Annapolis Public Utilities Company.

Abandonment of Line Proposed.—Directors of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., have adopted a declaration of abandonment of that part of its line known as the Dunkirk & Point Gratiot line and operated between the city of Dunkirk and Point Gratiot. A special meeting of the stockholders of the company was called for Feb. 15 for the purpose of ratifying and voting upon the declaration of abandonment. Peter C. Schutrum is president of the Buffalo & Lake Eric Traction Company and M. J. Binkley is secretary. The directors of the railway say the line never has paid.

Reorganization Plan Declared Operative.-The plan for the reorganization of the Michigan United Railway, Jackson, Mich., referred to previously in the ELECTRIC RAILWAY JOURNAL has heen declared operative. The holders of more than 90 per cent of the outstanding bonds gave their consent. There was some opposition to the plan on the part of the holders of the income debentures and the preferred capital stock. but the reorganization committee reports the deposit of a large amount of the outstanding capital stock and debentures. The reorganization plan provides that each debenture holder shall receive one share of com-mon stock of the company to be organized for each \$100 face amount of the debentures held by him, and that each holder of preferred stock shall receive one-half share of common stock of the new company to be organized for each share of preferred stock now held by him. It also grants to the holders of the debentures and preferred stock subscription rights which, if exercised, will give to them 60 per cent of the common stock of the new company. The chairman of the committee is G. R. Cottrelle.

Traffic and Transportation

Bus Company Formed

Railway Lines in Los Angeles Will Install Bus Service—To Fight McAdoo Project

The Los Angeles Motor Bus Company has been organized by the Pacific Electric Railway and the Los Angeles Railway Corporation for the purpose of installing a bus service for the transportation of passengers within Los Angeles.

Application was filed on Feb. 5 with the Los Angeles Board of Public Utilities by the Los Angeles Motor Bus Company for a permit to operate bus service between Hollywood Boulevard and Santa Barbara Boulevard on Western Avenue. The service will be ten minutes during the rush hours and fifteen minutes during other hours of the day, commencing at 6 a.m. and operating until midnight, with a provision that more frequent service is to be operated to meet requirements of travel. The fare will be 10 cents, and free transfers will be issued between buses and cars of the two respective street railway lines to all of these companies' lines crossing Western Avenue. This involves four lines of the Pacific Electric Railway and the sixteen lines of the Los Angeles Railway crossing Western Avenue, according to the appli-

TRANSFERS PLANNED TO BUS LINE

A passenger paying a 10-cent fare on the Pacific Electric local street car lines within the 6-cent fare limit of Hollywood would be given a transfer to the Los Angeles motor bus line on Western Avenue, and the motor bus conductor would issue a transfer for any Los Angeles Railway or Pacific Electric Railway line crossing Western Avenue, it is also provided. This plan will permit a passenger to ride westbound within the local fare limits of Los Angeles and eastbound to the heart of the business district of the city, which is defined as the Temple blocks for the Los Angeles Railway and either the Sixth and Main Streets terminal or the Hill Street terminal for the Pacific Electric Railway.

If the application is granted it will provide a cross-town service for the western district of the city of Los Angeles, which has been urged by those have been disadvantageously who served under the existing street car service. Under the old arrangement passengers living on certain lines of the Pacific Electric have been obliged to pass around through the business district of Los Angeles in order to reach the Hollywood district, which has meant a loss of time and is claimed to be a detriment to the entire western district of the city. The installation of the bus line will correct that condition. The new motor bus company proposes to place in this service the highest type of motor buses that can be purchased, and each bus will cost approximately \$8,000.

Officials of the railway lines interested have stated to the Board of Public Utilities that they will install a similar service on Vermont Avenue between Los Feliz Boulevard and Third Street, if it is desired by the city.

The application was signed by George J. Kuhrts, vice-president and general manager of the Los Angeles Railway Corporation, and by D. W. Pontius, vice-president and general manager of the Pacific Electric Railway. The Board of Public Utilities set Feb. 9 as the date for a hearing on the application. On Feb. 13 the board will hear the Los Angeles Railway's application regarding any improvements or additions to its service.

At a later date to be fixed by the board a hearing will be held on the proposed bus application now pending before the board and submitted by William G. McAdoo, as attorney for Eastern capitalists, who plan to install a huge bus system of 125 double-deck buses to serve all sections of the city of Los Angeles.

. Just as the two local railway lines in Los Angeles opposed the application of the Eastern capitalists promoting a bus line, it is stated that the bus men in turn will be present to oppose the application of the railway lines. The Pacific Electric Railway at former hearings threatened to abandon the construction of its \$3,000,000 subway out of its Hill Street terminal in Los Angeles to provide rapid transit to and from Hollywood, if the Eastern financiers were granted franchises to install their bus The Eastern capitalists reply lines that with the granting of the bus franchises to them the subway will not be needed.

Richard W. Meade, who is conducting the fight for the Eastern capitalists, states that operation of bus lines as proposed by the company with which he is connected will not injure the present railway companies in Los Angeles. He states that his experience with the Fifth Avenue Coach Company in New York has taught him that the electric railways do not suffer any loss of patronage through the operation of a de luxe bus service such as he has proposed. The Easterners in opposing the bus lines as proposed by the railway contend that their application was filed first and they deserve first consideration.

Stage Temporarily Replaces Electric Car.—Auto stage service was employed by the North Coast Power Company, Vancouver, Wash., on its run between Chehalis and Centralia during a recent three-day shutdown of its electric railway. Suspension of service was due to the burning out of a generator in the power house.

Seven-Cent Fare Justified

Fight of Long Standing in Fort Worth Practically Terminated—City Wanted 5-Cent Rate

The Northern Texas Traction Company, which operates in Fort Worth, Tex., has won its fight to retain the 7-cent fare which has been charged in that city since soon after the signing of the armistice. N. A. Dodge, special master in chancery, who was appointed by the United States District Court for the Western District of Texas to conduct hearings and report on the company's earnings, investment, replacement values, percentage of return and fairness of return; has filed his report. He has found that the 7-cent fare now charged by the company is justified. The city sought to have the fare reduced to 6 cents, and if possible a return to the 5-cent fare was asked.

In his findings, Mr. Dodge reports that it has been shown that the company's net earnings under the 7-cent fare amount to \$391,406, which on a valuation of \$6,860,000 is less than 6 per cent. The company is entitled to this return or an even higher one, he says.

CONTROVERSY STARTED UNDER FORMER ADMINISTRATION

The fare fight in Fort Worth was begun during a former city administra-tion, under Mayor W. D. Davis. When E. R. Cockrell was elected Mayor, his administration inherited this litigation. and with the change in administration the new city officials felt that they were called on not to push the fight as hard as had been done under the former Mayor. Accordingly the matter was permitted to rest. The appointment permitted to rest. of Mr. Dodge as referee in the case was made while Mayor Davis was in office. and what is termed as the "first hearing" in the matter was held by the referee before Mayor Davis went out of office. Eighteen months later what is termed as the "second hearing" was held in August and September, 1922,..

At the outset, the referee admits that the fixing of fares is a legislative right held by the City Commission as granted in the City Charter. At this point, however, he calls attention to the Fourteenth Amendment and holds that fixing a rate too low to give a reasonable income to the property holders would be depriving them of their property without due process of law and would be in violation of the Fourteenth Amendment.

In opening the hearing, the city of Fort Worth took the position that the city had ordered the 6-cent fare restored, whereupon the traction company had gone into Federal Court and secured an injunction restraining the city from enforcing the 6-cent fare ordinance, claiming the 6-cent fare would be confiscatory. It then devolved upon the company to present proof to show that the 6-cent fare would be in truth confiscatory. This placed the burden of proof on the company, and this position was accepted by the referee.

At the second hearing, last August and September, Halbert P. Gillette, for

the company, qualified as an expert in traction company operations; G. F Wells and R. G. Tabor qualified as appraisal engineers. Joseph McShane, for the city, qualified as a certified public accountant engaged in rate regulation of public utilities, but declined to qualify as an engineer, economist or railway operator.

Reviewing the testimony, the opinion cites that some lines of the city do not pay a reasonable income, while others pay a fair profit, and holds that for the company to abandon those lines which are not profitable and operate only those which are profitable would present a serious situation.

Additions to the company's property, as well as improvements, amounted to \$300,000 annually for several years, the opinion points out. From Jan. 1, 1921, to June 30, 1922, the company spent \$457,721 on additions, while for the period of Jan. 1, 1915, to June 30, 1922, the outlay was \$1,807,850. Trackage mileage shows a 132 per cent increase

for fifteen years.

The contention of Joseph M. McShane in the second hearing that the company is giving more service than is necessary is cited by the referee. He points out that the opinion of Mr. McShane was vigorously disputed by the company and that the city's expert modified his contention in cross-examination and that Mr. McShane did not suggest service reductions, but said they were matters to be worked out by the traffic department of the company.

ONE-MAN CARS PRAISED

The report discusses the operation of Birney one-man cars in Fort Worth and praises them, agreeing with the city that their operation would cut down The reports say, in conexpenses. clusion, that so far as the city is concerned in this inquiry the company has shown that a 7-cent fare is reasonable. The reports also said that the company was furnishing a dependable high-class street car service, which was in compliance with its obligation to the public in that respect, and appeared to have carried out a reasonable program of additions and extensions. On the question of extension the statement reads;

With the matter of future additions and extensions to reach and serve outlying communities recently taken into the city, the master, of course, has nothing to do, but it may be observed that any such additions and extensions require new capital and add to the value of the property on which the company is entitled to receive fair return

Passage of Act Will Mean Five-Cent Fare. A flat 5-cent fare in the city of Providence on all trolleys and buses operating within the city limits will obtain if an act introduced in the House on Feb. 13 by Representative James H. Klernan of Providence becomes a law. The act was referred to the judiciary committee. The measure directs the Public Utilities Commission to devise a uniform 5-cent fare within the city and to issue its order to all persons, firms or corporations operating trolleys or buses to put such rate of face into offect not later than July I

New Jersey Fare Bill Introduced

Assemblyman William George, Democratic minority leader in the House, on Jan. 31 introduced the bill that aims to carry out the ideas of Governor Silzer of New Jersey along the line of lower fares by forcing the Public Service Railway either to agree to a lower valuation or give up its franchise.

Boiled down, the Silzer plan is to allow the Public Service Railway to earn profits on the reduced valuation at a rate to be adjusted on a sliding scale according to the rate of fare charged. In its preamble the bill says in part:

In its preamble the bill says in part:

Franchises granted to public utilities of the State by political subdivision thereof have been held by the courts of the State to be grants upon conditions, which may be altered by the exercise of the sovereign power of the State.

Refusal of any public utility to observe and conform to such changes and alterations in the terms of the grants as may be imposed by the Legislature of the State, or any duly constituted agency thereof vested with authority to order such changes and alterations, makes voldable such grants. Therefore, to the end that as soon as is practicable, under the conditions imposed by this act, a basic fare of 5 cents may be established for street railway companies operating in this State.

Then follows a long varies of agent.

Then follows a long series of provisions setting forth just how the new plan is to be worked out. The bills provide that if the traction company refuses to accept the new policy, the Public Service Railway franchise in the streets of New Jersey shall cease within three months after the passage of the bill, and within six months the poles, wires, tracks and other equipment of the company shall be removed, the idea apparently being that a system of buses could be used in the emergency and while the transportation system is being worked out along new lines.

Another "Pass" in San Diego

In addition to the city car line and suburban passes placed on sale when the San Diego (Calif.) Electric Railway adopted the weekly pass system of fare on Jan. 1. Manager Claus Spreckels has announced the addition of another pass, effective with the week beginning Feb. 5. This new member of San Diego's pass family is called the "Tourist System Pass," and is good over the company's entire system, including all suburban lines and beach lines and the San Diego-Coronado ferry.

The new pass sells for \$1.50, and is aimed to encourage tourists to see San Hiego by street car. The Tourist System Pass is transferable and in every other respect usable in the same manner as the other forms of weekly passes heretofore offered, but has this difference-it is sold only at the downtown ticket office of the company while the other forms of passes can be purchased from the conductors on the cars. The new passes went on sale Feb. 2 and the company reports a good demand for them.

The company is using publicity as well as display advertising space in the newspapers in marketing its transportation. The advertisements often list the various attractions and amusements which the company suggests to holders of the car passes

One-Man Cars for Camden. - The Public Service Railway, Newark, N. J., will install one-man cars on all the Broadway lines on Feb. 18 at Camden, N. J. These routes include cars running to Camden, Gloucester, Woodbury, Mantua, Blackwood, Almonesson and National Park. Service will be increased 20 per cent on the line by the change. The number of cars will be increased from twenty-three to thirty.

Applies for Bus Privilege. - The Wheeling (W. Va.) Fublic Service Company has applied to the city for the right to operate buses in East and North Wheeling. The time has come, according to M. R. Stern, manager of the Wheeling Public Service Company, when electric cars and buses must supplement each other in the transportation of passengers. He said further that the car would remain the mainstay of urban and suburban transportation, but that the bus should be used as a feeder or an extension of the electric railway service.

Compromise on Fare Reached. - A compromise has been reached between the city of Waco, Tex., and the Texas Electric Railway, which owns and operates the street car lines in that city, whereby the 5-cent fare will be continued in force. The company had threatened to use only one-man cars and to operate these on an eighteenminute schedule unless the city granted an increase in fares to 7 cents. Under the compromise agreement, the company will place one-man cars in service on the Baylor-Provident Heights line, with a ten-minute schedule.

Bill Authorizing Buses Passed,-A bill authorizing the city of Seattle to operate motor buses in connection with its municipally owned railway system has been passed by the Legislature. The bill will permit Seattle to operate buses in outlying districts, instead of extending the railway. At the same time it will also give the city the right to parallel and operate buses along the line of the Rainier Valley Railway, which did not become the property of the city when it took over the local lines of Stone & Webster. The bill expressly removes any jurisdiction which the State Department of Public Works might have over such buses and leaves their supervision entirely in the hands of the city.

Changes Introduced in Fare Ordinance.-Councilman Oliver T. Erickson has introduced in the Seattle Council a bill for a change in the 5-cent fare ordinance, passed by the Council and approved by the Mayor. The original bill provides for a 5-cent fare, with a token costing 11 cents or 2 cents in addition for a transfer. Councilman Erickson's bill provides for a 5-cent fare, without transfer, and the issuance of transfers for an additional 2 cents or the presentation of a token sold at 61 cents, or four for 25 cents. The bill, which is understood to have the support of Mr. Henderson, superintendent of railways, as preferable to the sale of tokens for transfers alone, was referred to the city utilities and finance comntittee.

Clamor for Five-Cent Fare Ill-Considered

Despite the fact that the Philadelphia Rapid Transit Company is building new cars and planning expensive crosstown lines, and that fares in Philadelphia are lower than elsewhere, considering kind and quality of service rendered, says Service Talks, published by the company, an ill-considered clamor for a 5-cent fare has been started. This agitation is futile, says the company, in that it cannot change the facts upon which the permanent fare will be fixed, and harmful in that it temporarily disturbs the company's credit and so prevents consideration of further improvements.

Says Service Talks:

Says Service Talks:

P. R. T. men and management have, for several years past, created more than \$16,000,000 a year, added income, by supersalesmanship and super-efficiency in operation, as compared with other cities. This added income has rebuilt P. R. T. property and has overcome more than 100 per cent increase in operating costs, with but 19 per cent increase in fares. This accomplishment of men and management enabled P. R. T. to take over the Frankford "L" and the Bustleton-Byberry line, thus relieving the city of a great burden which is now costing P. R. T. more than \$1.000,000 a year net loss.

City and company engineers agree on the inventory of property used by P. R. T. in supplying service to the public. Unit values as presented by P. R. T., in accordance with Supreme Court rulings, are more than sufficient to justify continuance of present fare. P. R. T. is anxious to hasten the valuation hearings to a conclusion, but must retain its right to reveal inaccuracies in the city's figures by cross-examining the experts responsible therefor.

It is inconceivable that the accomplishments of P. R. T. men and management will be overthrown by an arbitrary reduction in the fare, rendering P. R. T. unable to proceed with its program of improvements, and impotent to undertake the operation of additional city-built lines.

Mayor Moore of Philadelphia issued P. R. T, men and management have, for

Mayor Moore of Philadelphia issued a statement on Feb. 5 in which he said there is nothing in the Philadelphia Rapid Transit talks to discourage continued advocacy of a 5-cent fare. The company, he said, claims to have made super-efforts to increase service, but increase is not perceptible. Because of these super-efforts the company admits an increased income of \$16,000,000 since the 7-cent fare started, the Mayor said, and continued:

If its income has thus been increased and it has been able to pay dividends and lay aside special funds, it justifies the public suggestion that it should return to the 5-cent fare as per the agreement of 1907.

City Will Plead in Memphis Case

The city of Memphis will be given a hearing in the circuit court to test whether a civil court has the power to review a public utility rate base set by the state commission.

The case, which will come up in Nashville, arose out of the dispute between the city of Memphis and the utilities commission when that body decided that the Memphis Street Railway was entitled to a return on an investment of \$11,800,000. The city contended that this rate was too high by about \$2,000,000.

The Public Utilities Commission decided for the company. The city took the matter into the Circuit Court of Davidson County, but could not secure

a hearing on the question. cfforts to obtain a hearing before a special judge proved futile.

The Memphis Street Railway was allowed a 7-cent fare largely because of the capital value fixed by the commission and protested by the city.

Passage of Bill May Bear Heavily on Treasury

A bill pending in the Legislature now in session at Olympia, Wash., provides for a day off in each seven for all conductors and motormen employed on Seattle street cars and has the backing of the street car men's union, represented by M. J. Murray, president. The passage of the bill will not bear upon the treasury of the Seattle Municipal Railway unless further action is taken to obtain pay for the day off, George W. Russell, superintendent of utilities. states.

If, however, the City Council changes the working arrangement of the men and agrees to pay them for the day off, it will add approximately \$23,500 monthly to the operating cost of the lines. The men are now paid a monthly wage of \$155, based on an eight-hour workday. If they work nine hours they receive time and a half for the extra hour. If they work less than eight hours they are paid according to the hours worked

Rerouting Changes Recommended

The Technical Advisory Corporation of New York, consulting engineers for the City Planning Board of Springfield, presented its report to the Springfield City Council Feb. 12.

In its finding the corporation recommended that the lines of the Springfield (Mass.) Street Railway be rerouted through the business district in a manner to reduce by one-half the number of cars passing through Main Street, and effecting a substantial reduction of car mileage, without abridging service in any of the outlying districts. This would be effected by transferring more of the lines to Dwight Street and by establishing a loop at Vernon Street and Broadway for the cars crossing the Hampden County Memorial Bridge. The report also recommended the more direct routing of cars to the residential suburb of Longmeadow.

The view is expressed in the report that the only decided opposition to routing more of the car lines one block east of Main Street would come from retail merchants, and the opinion is given that the merchants would in reality gain as much through the increased velocity of car traffic as they would lose in the running of cars further from the stores.

In the same report the car company was advised to establish gradually a system of feeder motor bus lines, to be replaced eventually by trackless trolleys. A temporary service somewhat along these lines is now being given over the Memorial Bridge.

Repeated President Ham Replies to Critics of His Company

Noting that the Senators from Tennessee and Alabama were outspoken in their criticism of existing conditions on the lines of the Washington Railway & Electric Company, in the District of Columbia, William F. Ham, president of that company, in a letter has pointed out for the benefit of Senator Heflin of Alabama and Senator McKellar of Tennessee that in the four largest cities in Tennessee and the two largest cities in Alabama the fares are as follows: Nashville, 7 cents straight; Memphis, 7 cents straight; Chattanooga, 7 cents straight; Knoxville, 6 cents straight; Birmingham, 8 cents, fifteen tickets for \$1; transfer charge, 2 cents; Mobile, 8 cents cash fare; ticket rate, 7 cents; transfer charge, 1 cent. Said Mr. Ham:

All of the above cities have overhead trolley construction, whereas we have underground construction, which, as you know costs two or three times as much to construct and maintain, and besides have a wage scale for trainmen from 51 cents to 56 cents an hour.

In Mr. Ham's letter he called attention to the fact that the wages paid by the street railways in the six Southern cities which he mentioned ran from 38 cents to 50 cents an hour.

Mr. Ham said that the expenses or his company within the District, without any interest charges, or return upon investment, amounted during the year 1922 to 6.26 cents per pay passenger. In conclusion Mr. Ham said:

With an 8-cent fare and tickets at the rate of six for 40 cents in Washington the average fare per pay passenger is slightly less than 7 cents, leaving, as you see, a very small margin for return upon investment and, of course, establishing beyond peradventure that any reduction in fare, under existing conditions, is out of the question, much less a return to the pre-war rates of fare.

Senator McKellar announced he would reply to Mr. Ham's letter on the floor of the Senate. He said that he was familiar with the street railway conditions in Memphis and that the company there was in much the same position as the Washington Railway & Electric Company. He said he felt sure that the city authorities eventually would compel the company in Memphis to return to its old contract and charge a 5-cent fare.

Senator McKellar on Feb. 8 made good his threat to reply. He declared that the higher fares in Tennessee are due to the State Public Utilities Commission, and predicted that that commission will be abolished by the present Legislature, and the railways subsequently compelled to return to their contract rates. He favors abolition of the Tennessee Utilities Commission, declaring neither it nor the one in Washington had been created to raise railway fares above the contract rates. He is reported to have said:

Is reported to have said:

There is a similarity between the Memphis situation and that of one of the Washington railways, namely, that in each place the company is undertaking to secure fareshigh enough to earn dividends on watered stock. During the time I have been in Memphis the company has been reorganized two or three times, and each time there is an enormous addition to the stock issued. Just now, even with 7-cent fares, that company is not able to make dividends on its watered stock.

Legal Notes

CONNECTICUT—No Appeal Lies from a Finding of a Public Service Commission As to Which of Several Applicants Should Receive a Certificate to Operate over a Specified Route.

Notwithstanding various acts, providing for appeals to the superior court by persons aggrieved by an act or order of the public utilities commission, no appeal lies from a finding of that commission as to which of several applicants should receive a certificate to operate a jltney over a specified route, since this was a purely administrative question. The only points which can be raised in such a case is whether the action of the commission was beyond its statutory powers, or whether it had acted arbitrarily, as without due notice and due hearing. [Modeste vs. Connecticut Company, 117 Atlantic Rep., 494.]

CONNECTICUT—Operator of Inherently Dangerous Amusement Device Not Insurer of Safety of Patrons.

This was an action for injuries to the patron of amusement device, in which the only negligence claimed was the operation of a device in which the person using it rolls down an incline over a series of bumps. The court held that such a device Is inherently dangerous, and the plaintiff must prove that the operation of the appliance in the usual way and for the intended purpose is in itself so dangerous that injury can reasonably be expected to occur. [Godfrey vs. Connecticut Company, et. al., 118 Atlantic Rep., 446.]

FEDERAL COURTS—Extension of Contract With City, Which Permitted Operation After Expiration of Term, Held Not to Extend Fore Contract.

Where a contract between a city and a street railroad company fixed the fare at 5 cents, and gave the company the right to continue permanently to operate after the expiration of the contract until the city elected to purchase the lines, the extensions of the company's charter and its right to occupy the streets by act of the Legislature did not require the company to operate at the contract rate after the expiration of the original contract, and before the city exercised its option to purchase the line. [City of Louisville vs. Louisville Railway, 281 Federal Rep., 353.]

FEGERAL COURTS—Confiscation By Refusal of State Commission to Permit Increase of Rates May Be Enjoined,

Whether a rate to be charged by a public service corporation was confiscatory when prescribed by a state commission, or whether, though reasonable when prescribed, it becomes confiscatory by reason of changed conditions, the power of the courts is equally

ample, and its exercise is equally obligatory to enjoin confiscation effected by refusal to permit an increase. [Augusta-Aiken Railway & Electric Corporation vs. Railroad Commission of South Carolina, et al. 281 Federal Rep., 977.]

FEDERAL COURTS—Property Covered By a Mortgage Defined.

Where a street railway company which mortgaged its property, including the property thereafter constructed or acquired, had power under its charter to lay double tracks on specified routes, the lien of the mortgage covers the double track laid on such routes by the successor of the mortgagor though they were laid under new franchises obtained by the successor from the city. The mortgage also covers all new equipment, cars, poles, etc., acquired for use on those lines. The fact that part of this property was purchased from the proceeds of a subsequent mortgage, not give the bondholders under the subsequent mortgage priority over the prior mortgages as to the equipment so purchased. Where, however, the successor company had placed in the power houses covered by the mortgage executed by its predecessor machinery for furnishing light and power. which the mortgagor was not authorized to furnish, and which was therefore not covered by its mortgage, the successor could remove such machinery before the foreclosure sale provided it was not so attached to the real property as to be a fixture. [Commercial Trust Co. vs. Chattanooga Railway & Light Company, et al. Maryland Trust Co. vs. same. 281 Federal Rep., 856.]

MARYLAND—Change of Route Held to Constitute An Abandonment of Rights in Old Right-of-Way.

Where a railway company, obeying an ordinance directing the removal of its tracks from one street to another, removed its tracks from a portion of a strip of land condemned and changed the route, the removal and change operated as an abandonment of its right of way in such portion of the land, and it had no right to construct a switch track thereon. [Hagerstown & Frederick Railway vs. Grove, et ux. 118 Atlantic Rep., 167.]

MASSACHUSETTS—Department of Public Utilities Authorized to Grant Locations for Tracks on Particular Street.

Under the public utilities act, the State department of public utilities, within rational limits, may order whatever approaches, tracks, and connections are found desirable for an inclosed area for the transfer of street car passengers, and has authority to grant a location for tracks on a par-

ticular street, though a fire house or other municipal buildings were on that street. [City of Cambridge vs. Boston Elevated Railway, 135 Northeast, Rep., 313.]

Massachusetts—Violation of Speed Statute By Automobile Driver, Contributing to Injury, Is a Defense.

If the driver of an automobile, as to speed and control, contrary to Gen. Laws, chap. 90, sec. 14, 17, contributed to the driver's injury in a collision with a street car, there could be no recovery. [Daris vs. Middlesex & Boston Street Railway, 136 Northeastern Rep., 68,]

MISSOURI—Passenger Injured While Alighting From Moving Car Recovers.

A passenger, injured while alighting from a moving car, may recover damages if the conductor opened the door and ordered him to get off before the car had stopped, and the car had its speed suddenly increased, while he was alighting, even if the conductor opened the door at the passenger's request. [Leonard vs. United Rys. of St. Louis, 239 Southwest. Rep., 892.]

NEW YORK—Injury in Turnstile Because of Crowd.

Where a passenger was about to use a turnstile gate at a subway station and was jostled by the crowd and to steady himself placed his hand on the arms of the turnstile and was cut or squeezed by a rough piece of exposed metal, the carrier was not liable. [Chakosky vs. Interborough Rapid Transit Company, 195 New York Sup., 79.]

New York—Operation of Crosstown
Bus Line by City Without Obtaining Revenue Therefrom Held Unconstitutional.

The operation of a crosstown bus line by the city under agreement giving the owner of bus line the revenue therefrom—held violative of Const. art. 8, sec. 10, prohibiting a city from giving or loaning money to or in aid of any individual or corporation, and from incurring debts except for city purposes. In such case a taxpaying railroad, which was operating a competing line, had a right to maintain an action to restrain such illegal acts on the part of the city. [Belt Line Railway Corporation vs. City of New York, et al., 195 New York Sup., 203.]

UTAH — Working on Car Which May Be Used Either Intrastate or Interstate Is Not Employment in "Interstate Commerce."

An employee, who is engaged in repairing a car belonging to a company engaged in both interstate and intrastate commerce, and which car has been in the past used in either commerce is not employed in interstate commerce within the Federal Employers' Liability Act. [Utah Rapid Transit Co. et al. vs. Industrial Commission of Utah et al., 204 Pacific Rep. 87.]

Personal Items

Mr. Engle Appointed New Youngstown Supervisor

New Commissioner Names A. W. Hartford, W. H. Muldoon and F. R. de Maree as Assistants

Harry Engle, recently appointed by the Mayor as the city's Street Railway Commissioner under the service-at-cost ordinance governing the operations of the Youngstown Municipal Railway, has been connected with railway and light and power utilities since youth. He was born in Dayton, Ohio, on Nov. 19, 1881, and was educated in the Dayton public schools. Upon the sudden death of his father, he was thrown upon his own resources, and in 1900 began work as a conductor on the lines of the City Railway, Dayton, which had been built and were controlled by his uncle, the late David B. Corson, who was one of the pioneer builders of electric railways in Ohio. After a short period Mr. Engle became connected with the Mulford-Petry street car advertising interest and was stationed for this company in Dayton, Indianapolis, Toledo, Saginaw and Youngstown. In the latter city he became identified in 1906 with the local railway and electric companies and was with them almost continuously until the time of his appointment as street railway commissioner of the city, serving as salesman, purchasing agent, commercial agent and in other capacities, and for a time being treasurer of the Mahoning County Light Company.

A. W. Hartford, appointed by Commissioner Engle as his assistant to have charge of the railway division of the commissioner's office, was formerly manager of the Youngstown & Suburban Railway, which position he resigned in October, 1921, to take a protracted rest in the South. Mr. Hartford is a native of Detroit, Mich., where he was born on Jan. 18, 1871. He was educated in the public schools there and entered the electric railway industry in 1900, when he became a motorman on the interurban line between Detroit and Jackson, now a part of the Detroit United Railway. He soon became a dispatcher for the line and at the end of five years went to Youngstown in a similar capacity for the Youngstown & Southern Railroad, now the Youngstown & Suburban Railway. Shortly afterward he was promoted to general superintendent, and in 1912 was made general manager, continuing in that position until his resignation in 1921.

William H. Muldoon has been appointed by Commissioner Engle as assistant in charge of motor bus operations for the commissioner's office. Mr. Muldoon was auditor for the commissioner during the four-year term of William L. Sause. The Youngstown Municipal Railway is operating two motor bus lines and has ordered eleven additional

buses for operation of two additional lines, which will bring the total number of buses in operation up to eighteen.

Fred R. de Maree has been appointed auditor in the railway commissioner's office by Mr. Engle. He has been employed as deputy in the City Auditor's office for three years.

Mr. Richardson Vice-President of Chicago Surface Lines

G. A. Richardson, formerly vicepresident in charge of operation of the Philadelphia Rapid Transit Company, has been elected vice-president of the Chicago Surface Lines in charge of operation. As previously noted in the ELECTRIC RAILWAY JOURNAL, he has already entered upon his new duties.



G. A. Richardson

Before becoming connected with the Philadelphia Rapid Transit Company in April, 1919, as superintendent of transportation, his first office with the company, Mr. Richardson was general superintendent of the Puget Sound Traction, Light & Power Company,

Seattle.

Mr. Richardson is recognized nationally as a transportation expert. So successful was his handling of transportation matters on the Pacific Coast and on other properties with which he has heen connected that his advice and help have been solicited in connection with the solution of problems in a number of cases arising in other cities. It was Mr. Richardson who was called to help solve the transportation problem of the Hog Island shipyard. The system there comprised steam, electric and ferry service. Five months after Mr. Richarson's visit Hog Island had 80 miles of track and 18 miles of roadway within the confines of the yard.

assisted in connection with the affairs of the Rochester (N. Y.) Surface Lines, and in 1914 made an extensive investigation and report on the transportation facilities of the Chicago Elevated Rail-Mr. Richardson also reported on the facilities of the Brooklyn Rapid Transit Company following the appointment of a receiver for that company. Owing to demands upon his time, however, his work in Brooklyn was confined to the elevated and subway lines.

Mr. Richardson was born in Boston, Mass., in 1882. He was graduated from the Mechanic Arts High School in 1900. Later he took a post-graduate course there. In February, 1901, he entered the employ of the Boston Elevated Railway. He worked for this company in the shops, in the train service, in the mechanical department and in the power stations. In 1904 he became connected with the Boston & Northern Street Railway, and in May, 1905, went with the Stone & Webster forces, with which he continued until

W. B. Adams Appointed Assistant Director of Traffic

W. B. Adams has been appointed assistant director of traffic of the Los Angeles (Calif.) Railway. Mr. Adams has had several years' experience in the operating department of the city lines of Detroit before their purchase by the municipality. He was at one time assistant superintendent of the Woodward and Hamilton divisions, operating local and interurban cars.

In his new capacity with the Los Angeles Railway he will assist in the movement of cars as directed by the outside supervisors and the emergency telephone dispatching board.

Mr. Adams is largely responsible for the introduction of a new system on the Los Angeles Railway whereby each line is in charge of one supervisor, working in conjunction with the dispatchers' telephone board, in place of the former system of a supervisor at each end of a line. It has been found that the use of one man on a line eliminates duplication of orders and has been effective in cutting down the number of turnbacks due to delays.

Changes in Alabama Power Organization

The Alabama Power Company has transferred the headquarters of its Southern Division from Selma to Montgomery, the company having recently concluded arrangements by which it took over the property of the Montgomery Light & Traction Company. The removal of the Southern Division offices to Montgomery necessitated a number of important divisional changes, as announced by General Manager Yates. The Southern Division now includes the towns of Clanten, Selma, Marion, Marion Junction, Montgomery, Aubrey, Opelika, Auburn, Tuskegee and Notasulga.

J. M. Barry, for the past eighteen months assistant chief engineer of the

the Southern Division. L. P. Sweatt has been transferred from manager of the Eastern Division to division superintendent at Montgomery.

In establishing a divisional office at Montgomery, General Manager Yates stated that it was necessary to make the following additional changes in the divisional organization:

W. M. Stanley who is manager of the Northern Division, will, under the new order of things, become manager of the Eastern Division.

the Western Division, will become manager of the Northern Division.

C. B. McManus will be transferred from superintendent of the Muscle Shoals steam plant to manager of the Western Division.

E. C. Wilson will become district manager at Selma, Marion and Marion Junction.

H. L. Ames will become superintendent of the Muscle Shoals steam

The personnel of the local utilities at Montgomery which were taken over will not be altered.

A. E. Myers Acting Superintendent at Loweli

Maurice E. McCormick, manager of the Lowell division of the Eastern Massachusetts Street Railway, Boston, Mass., has announced that Albert E. Myers, former superintendent of the thelsea division of the Eastern Massachusetts Street Railway, has been appointed acting superintendent at Lowell to fill the place made vacant by the recent resignation of Charles E. Whelan.

The new acting superintendent was connected with the local railway for fifteen years, from 1890 to 1905. He served with the old Bay State Street Rallway in many capacities, having acted as starter for a number of years and having handled many of the operating details now taken care of by the superintendent.

Since 1905 Mr. Myers has filled several supervisory positions with the Melrose-Woburn and Chelsea division. He has been superintendent of the Chelsen division for many years.

George Le Boutillier with Long Island Railroad

At a meeting of the board of directors of the Long Island Railroad on Jan. 18, the organization was changed to permit of the election of an additional vicepresident, who shall assist the president in the general control of all affairs of the company, its property and husiness, and of all departments of its service, and in the absence or disability of the president, exercise and perform all the powers and duties of the latter.

theorge Lelloutillier was that day , lected vice-president, and also a director, to fill the vacancy caused by the recent death of T DeWitt Cuyler

For twenty seven years Mr. LeBoutil lier has served the Pennsylvania sys

company, has been made manager of tem in various important capacities. Until very recently he was located at Harrisburg, Pa., where he occupied the position of general superintendent of the Eastern Pennsylvania Division.

Mr. LeBoutillier has been selected by President Ralph Peters, with the united approval of all his Pennsylvania Railroad associates, as the man to assist him, and gradually to take up his work of directing and managing the properties of the Long Island Railroad.

Mr. LeBoutillier is in his fortyseventh year. He was born in Cincin-O. K. Seyforth, who is manager of nati. Ohio, and after graduating from the University of Cincinnati he entered the service of the Pennsylvania Railroad Aug. 1, 1895, as rodman on the lines west of Pittsburgh. He has been consecutively assistant engineer, division engineer, engineer maintenance of way. division superintendent and general superintendent. His headquarters will be in the office of President Peters at the Pennsylvania Station.

J. R. Bibbins Resigns Chamber of Commerce Post

J. Rowland Bibbins, engineer, has resigned as manager, Transportation Department, United States Chamber of Commerce, to engage in consulting engineering practice in transportation and its related economic and civic problems, including district and traffic surveys, railway terminal and transit development, rapid transit service, routing and improvements, valuations and franchise arbitrations, and transportation aspects of the city plan.

During his two years in Washington, Mr. Bibbins devoted special study to the whole group of transport agenciesrailway, traction, highway, waterway, airway, and marine-and their relative status and possibilities of co-ordinated development, all in connection with legislation and public policy. In this work he was closely associated with an advisory committee comprising prominent representative executives, bankers, engineers, and economists, under whose guidance the need of a national policy of co-ordination was visualized.

Mr. Bibbins was previously associated with the Bion J. Arnold engineering organization of Chicago, as supervising engineer, and in this consulting work studied intensively the transportation problems of some twenty cities of the United States and Canada, not only in rapid transit, but also in railroad and port terminals, civic development, valuations, and the economic policies involved therein. Much of this work involved arbitrations between public authorities and operating companies.

Educated in Haltlmore and the University of Michigan, Mr. Hibbins early acquired direct experience in electric and rallway utilities in Detroit, and with manufacturing and power development in the Westinghouse companies as commercial engineer. He has been honored by various engineering associations and civic bodies in whose activities he has been an ardent and intelligent worker

Obituary

Alexander Rodger McCallum

American engineers who knew Alexander Rodger McCallum, London, will be shocked to learn that he was accidently killed on the Midland Railway near Chesterfield on Dec. 11 while traveling to transact business with steelmakers on behalf of his firm, C. P. Sandberg, consulting engineers.

Born in 1886, Mr. McCallum was the elder son of a London journalist who is the writer of the British monthly notes in this paper. He was educated at Mercers School, in the City of London, and afterward at the Central Technical College of the City and Guilds of London Institute, South Kensington. There in 1906 he graduated with honors as Bachelor of Science in the Faculty of Engineering and the University of London. A course of some two years as an engineering pupil in the electric manufacturing works of Messrs. Dick, Kerr & Company, Preston, followed. and then from 1908 to 1912 he held a succession of posts, both on the engineering and traffic sides, with the London United Tramways, thus acquiring an all-round practical knowledge of electric tramwny operation and maintennnce

The next step was his appointment to be an assistant to the mechanical engineer of the London underground electric railways. Soon becoming chief assistant, Mr. McCallum had full control of the repair and maintenance of the rolling stock of these railways, and of the running of the repair shops connected with them. In 1919 he formed one of a delegation of heads of departments of the underground railways who visited the United States to examine city transportation methods there. On that occasion Mr. McCallum made the acquaintance of a number of leading electric traction men in America.

In February, 1921, he was promoted to be an officer of the companies with the title of superintendent of rolling stock, but in May following he accepted an offer from C. P. Sandberg, consulting engineers, well known in New York. to become one of their assistants. Among the chief duties which he afterward carried out was the superintending of the installation in numerous British steel works of a plant for the production of Sandberg's patent sorbitic steel as applied in the case of railway carriage wheel tires.

Anton H. Classen, sixty-one years old, builder of the first railway system in Oklahoma City, died at his home in that city recently. His health had been failing for several years. Mr. Classen was born in Pekin, Ill. He went to Okla-homa in 1899. He became associated with John W. Shartel in establishing the first railway system in Oklahoma city, and on completion of the line became its president, with Mr. Shartel as vice-president and general manager.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Coal Hearings Soon

Commission Developing Facts in Advance—Chairman Hammond Favors as Little Legislation as

Possible

Efficiency and productivity of labor under union and non-union conditions are to be studied carefully by the President's Coal Commission. Public announcment that this will be undertaken was made by Chairman Hammond. He emphasized that it must be established whether or not it costs more money to produce coal at mines employing union labor than at those which observe an open-shop policy. The efficiency of labor in union mines, he said, is alleged to be 50 or 60 per cent, as compared with an efficiency of 80 per cent in non-union mines.

At the Feb. 3 conference with the Washington correspondents Mr. Hammond reiterated the importance which the commission is attaching to storage. An engineer has been assigned to investigate minutely the matter of local storage at the coal mines. He also said that the commission is more convinced than ever that the railroads must store coal and abandon the policy of commandeering, without specific permission in each case. The commission regards the danger from spontaneous combustion as being so slight as to make unnecessary any considerable further study of that phase of storage. The investigation will be confined largely to the costs of storage, rather than to any danger involved.

UNIFORM OPERATION OF MINES ESSENTIAL

Mr. Hammond frowned upon any attempt to divert surplus mine labor to agricultural work during slack business at mines, by the establishment of third-class fares or other expendients. He declared that a way should be found to maintain uniform operation of coal mines throughout the year, thus allowing surplus labor to take permanent employment in other lines. By keeping up the bars against immigration only a few years will be required, he said, until this surplus is absorbed.

A further study of superpower will be recommended by the commission, it was revealed at the conference. While it was admitted that mine-mouth use of coal has a limited application only, due to the difficulty in securing condensing water, yet it is believed much transportation of coal can be avoided by well-located central stations.

The commission has given no formal consideration to any plan for facilitating the financing of coal storage or the securing of insurance for such coal. In reply to questions, both Mr. Hammond

and Dr. George Otis Smith indicated that they see no reason why the commission should concern itself particularly with any plan to make paper covering coal in storage eligible for redisceunt at Federal Reserve banks or to take up other details of financing the handling of coal. So far as insurance is concerned, it was suggested that the best insurance for a coal pile is the installation of a crane and a clamshell bucket.

When asked what the commission thought of a plan to pool coal to be handled through large selling agencies, Mr. Hammond declared that such a recommendation likely would lead to a charge of paternalism. He admitted that the commission is very anxious to ascertain why a 5 per cent shortage causes a 200 per cent price advance and he said that the interests making up the coal industry should stop making faces at each other. He would hate to think any branch of the industry is as bad as the others claim it is.

The commission as yet has no definite idea as to the legislation it will recommend. Every effort will be made, Mr. Hammond asserted, to suggest as little legislation as is possible, just enough to insure the untrammeled play of economic forces. Before public hearings are undertaken, an effort will be made to secure substantial agreement on as many as possible of the controversial points. By resorting to this process of elimination, he believes the public hearings can be confined to the comparatively few points on which no agreement within the industry is anticipated. By that time, the commission will have developed a great many facts for itself and will be in a position to know if witnesses have their facts.

Large Order Placed for Economy Meters

The Public Service Railway, Newark, N. J., has signed contracts with the Economy Electric Devices Company for the purchase of 1,720 Economy meters suitable for all passenger cars. These meters include the kilowatt-hour car inspection dial feature and 120 have already been delivered. The Public Service Railway began a test with Economy meters last summer by equipping the Bloomfield line with sixty meters with car inspection dials. test was successful. The company next placed a rush order with the Economy Electric Devices Company for sixty more similar meters to equip another important line, and before the second sixty had been delivered negotiations were completed for the purchase of enough meters completely to equip all active cars, including Camden division.

Arrangements Made for Close Co-operation

The General Electric Company and the American Locomotive Company have made an agreement to co-ordinate more closely their effort in the design and manufacture of electric locomotives for use on steam or electric railways. A notice, under date of Feb. 15, was sent to railroad executives announcing the arrangement. It was signed jointly by Andrew Fletcher, president of the locomotive company, and Gerard Swope, president of the General Electric Company.

In making the arrangement at this time both companies have been influenced by the increased interest and business in railway electrification, both in the United States and abroad, which is manifesting itself and which indicates a considerable volume of work of this character in the near future. A recent survey of the locomotive department of the Erie works of the General Electric Company indicates that at present there are a larger number of orders from different customers than has been the case at any time since the beginning of the World War. Foreign business appears even more active than domestic. Spain, France, Chile, Japan, Mexico and South Africa are engaged in extensive projects, while other countries, including Italy and Great Britain, are seriously considering large scale electrifications.

For a number of years the American Locomotive Company and the General Electric Company have collaborated in the development of electric locomotives. The locomotive company has applied its knowledge and experience in the locomotive building art, particularly to the design of the mechanical elements, in the fabrication of which its manufacturing facilities were utilized, while the knowledge and experience of the General Electric Company were applied to the design of the electrical elements.

It is the satisfactory result of this collaboration which has led to the more formal relationship just announced, both companies believing that progress in the art can be most effectively assured by such means. The arrangement relates only to co-operation in design, development and manufacture and does not comprehend any financial relationships between the two companies.

Metal, Coal and Material Prices

Metal, Coal and Material I	rices
Metala—New York Copper, electrolytio, cents per lb. Copper wire base, cents per lb. Lead, cents per lb. Zinc, cents per lb. Tin, Straits, cents per lb.	. 13, 1923 15, 187 17, 125 8, 05 7, 30 41, 25
Bltuminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, grose tons	\$7.15 4 125 2.75 2.55 1.625 2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft. Weatherproof wire base, N. Y., cents per lb. Cement, Cbicago net prices, without bage. Linseed oil (5-bbl.lote), N. Y., cents per gal. White lead, (100-lb.keg), N. Y., cents per lb. Turpentine, (bbl. lots), N. Y., per gal.	7.25 17.125 \$2.20 99.00 13.125 \$1.48

\$954.968 Net for Brill

Car Company Had Orders on Hand Feb. 1 for \$11,000,000 as Compared with \$2,223,000 a Year Ago

For the year 1922 the combined output of the four plants of the J. G. Brill Company amounted in sales value to \$10,177,582. The combined output for each of the past six years follows:

1917				\$7,706,099
1915				16.761,154
1929	,			17,537,293
1521				10,177,552

The report of the company for the year says that the business depression, which was reflected in the reduced output of the company's plants for the year 1921, continued during the first six months of the year just passed. However, the result of the year's operation indicates the marked improvement in business during the last six months of 1922.

After deducting from earnings the cost of all maintenance and repairs for the year amounting to \$368,621 and after setting aside, out of earnings, a reserve for depreciation of plants and equipment amounting to \$221,803, the result of the operation of all the plants shows a profit of \$1,074,291, from which has been set aside a reserve for federal taxes of \$119,322, leaving a net profit for the year, after all charges and reserves, of \$954,968.

OPERATION OF SEPARATE CANADIAN PLANT ABANDONED

The Canadian Brill Company, Ltd., which was organized for the purpose

S VLES J.	AND G. III	EXPENDITURE	S OF THE
		YEAR 1922	

Total sales and other income Less materials and operating and general and administration ex- penses and depreciation for	9,103,291
the year	3,1,0,0,0
Operating profit	\$1,074,291 119,322
Net profit to surplus	\$954,968
Surplus as of Dec. 31, 1921 Add adjustments	
Add profit as above	\$2,94%,602 954,968
Less dividends paid	\$3,903,571
Net surplus earned as of Dec. 31, 1922	

of manufacturing Brill products in Canada, and for this purpose, on Sept. I, 1921, leased a plant at Preston, Ontario, decided, upon the expiration of its lease, that business in Canada, available for the company did not warrant a renewal of the lease and, therefore, the plant was turned back to the owners on Nov. I, 1922, and steps are now being taken to dissolve the company.

The amount of work on hand Feb. 1, 1923, is in excess of \$11,000,000 as compared with \$2,233,000 at this time last year.

Rolling Stock

Brooklyn (N. Y.) City Railroad is in the market for 500 new double-truck motor cars.

Georgia Railway & Power Company, Atlanta, Ga., will shortly add twenty ears to its equipment.

Louisville (Ky.) Railway lost eight double-truck and eleven single-truck cars in another carbouse fire on Feb. 16.

Springfield (Mass.) Street Railway, through President Wood, has announced its intention of buying ten or twelve cars of a large two-man type similar to those in use on the Boston Elevated lines. Each of these cars will carry fifty persons seated. No new open cars or one-man ears will be bought. About \$150,000 will be invested in the new equipment.

International Railway, Buffalo, N. Y., for the present will not replace with new equipment the cars which were destroyed in the fire at the Cold Springs station of the International some weeks ago. Herbert G. Tulley, president of the International, says that the Walden Avenue station of the company will be used for the paint shops until such time as the company is able to reconstruct the Cold Springs paint shops.

Hydro-Electric Power Commission of Ontario, Toronto, Ont., has recently ordered four double-truck, one-man, two-man safety cars for use on the Hydro-Electric Railway in the Windsor City district. The bodies were ordered from the St. Louis Car Company, the trucks from the Taylor Electric Truck Company and the electrical equipment from the Canadian General Electric Company. Delivery is expected during the month of April.

Track and Roadway

Municipal Railway, Seattle, Wash., through superintendent Henderson, has asked the City Council for permission to reconstruct the tracks on Westlake Avenue North, to bridge the tracks to grade between Roy Street and the Fremiont Avenue bridge, and to pave between tracks between Mercer and Roy Streets. The cost is estimated at \$99,000.

Georgia Rallway & Power Company, Atlanta, Ga., has removed old rails and has had the ground excavated from Fair Street to Glenn Street in preparation for rebuilding the tracks on Central Avenue from Fair Street to Dodd Avenue. Concrete foundations of beam construction will be laid at the same time as the paving. Ties will be spaced 5 ft. apart on which will be laid new 80-lb. A. S. C. E. rall.

Philadelphia (Pa.) Rapid Transit Company is planning the construction of three new crosstown routes connecting the Frankford district on the east with the Germantown and Nicetown districts on the west. First, the Eric Avenue route will be built, then the Wyomlng Avenue routes and last the Olney

Avenue route. They will be operated as early as possible in 1923 except those portions which must necessarily be delayed awaiting city street opening and bridging.

Trade Notes

Johnson Fare Box Company, Chicago, Ill., has opened an Eastern sales office and service station at 366 Madison Avenue, New York City.

Edwin L. Andrew has been appointed assistant to the manager of the department of publicity of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa. Mr. Andrew has been connected with the Westinghouse Company since 1916, for part of the time at East Pittsburgh, and also at the Cincinnati office of the Westinghouse Company.

National Railway Appliance Company, New York, N. Y., announces its appointment as agent for the Fort Pitt Spring & Manufacturing Company, Pittsburgh, Pa., for the States of New York and New Jersey. All inquiries on the products of this company which embrace coil, elliptic and volute springs for steam and electric railways and heavy duty springs for industrial concerns will receive prompt and careful attention at the company's office, Grand Central Terminal, 452 Lexington Avenue, New York.

New Advertising Literature

Railway Improvement Company, New York, N. Y., has issued an illustrated booklet on the Ransom vacuum oiler. It shows the oiler installed on motors on a large number of properties.

Power Specialty Company, New York, N. Y., has issued Bulletin EC-100, entitled "The Foster Economizer." This thirty-two page illustrated pamphlet gives a detailed description of the construction of the pressure parts and housing of the Foster economizer and its simplicity of operation.

United States Steel Corporation, New York, N. Y., has issued Bulletin No. 9, entitled Safety, Sanitation and Welfare. The pamphlet, containing some thirty or more pages, describes the company's organization, accident prevention activities and the first aid and rescue work, in which the employees have played conspicuous parts. The beoklet is illustrated.

General Electric Company, Schenectady, N. Y., announces that the electrical manufacturing plant in Bloomfield, N. J., known as the Sprague Electric Works, will hereafter be known as the Bloomfield plant of the General Electric Company. This plant, formerly the Sprague Electric Company, was acquired by the G. E. Company in 1902 and is engaged in the manufacture of electric metors, generators, controllers, etc., employing about 1,600 at the present time.

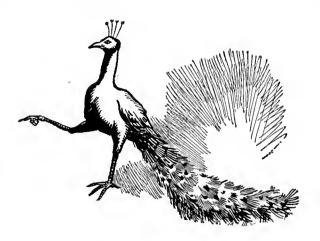
If

If—you operate safety cars—
If—you are anxious to be sure they're safe
If—you are studying safety features
If—you havn't equipped with Peacocks

Try them!



Peacock Staffless Brake



PEACOCK STAFFLESS BRAKES

will win competitive tests

That's the way to choose the proper hand-brake equipment for your safety cars. Equip some cars, one with each kind of brake you're considering, and let your motormen try them out under properly supervised tests—then you'll pick Peacocks.

Why? Because they will stop the car in the shortest time and distance.

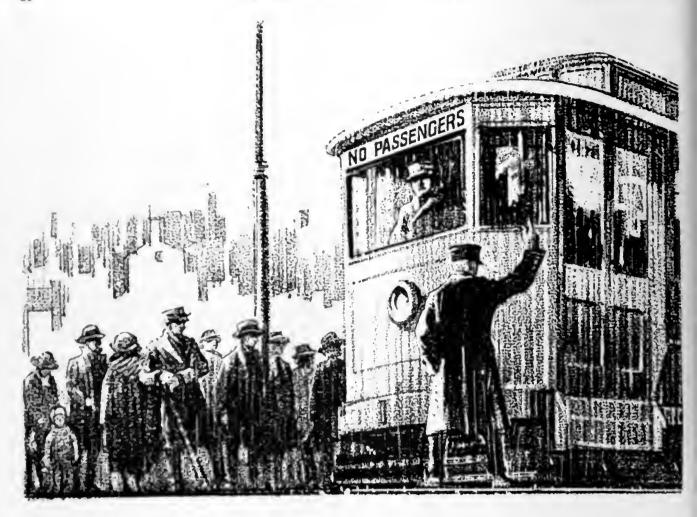
Peacock Staffless Brakes have greater braking power and operate more easily and quickly. You need them to give your safety cars the finishing touch of safety.

Make the test

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative, Lyman Tube & Supply Co., Ltd., Montreal



How Correct Lubrication prevents Car Failures

"OUT OF SERVICE" signs put wrinkles in the forehead of an Equipment Superintendent.

It is no news to him or to the Board of Directors that cars in the pit collect no fares.

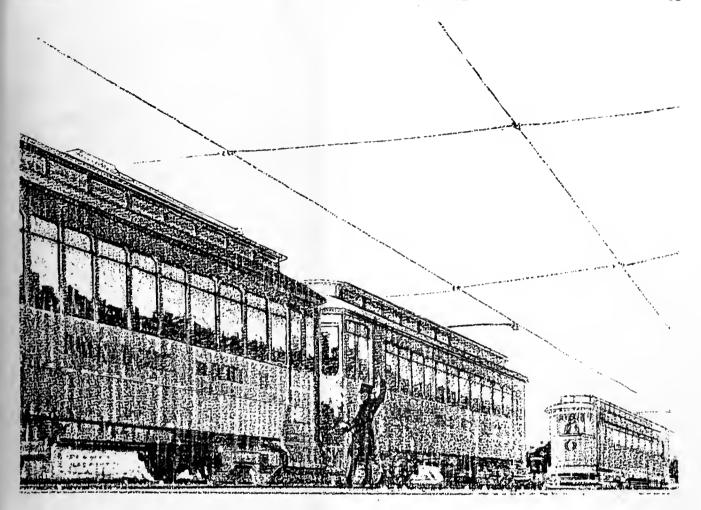
The Equipment Superintendent who analyzes the cause of his car failures can safely put his finger on incorrect lubrication as the chief trouble-maker.

He discovers that "any oil" won't

He sees the direct relation between the fares collected per car and the oil barrels that roll into his storerooms.

The best oil he can buy costs but a trifle compared with the cost of out-of-service cars—due to burned out armature bearings, hot journals, and failures of brake and door engines.

VACUUM OIL COMPANY



The Vacuum Oil Company's technical studies of causes and remedies for car failures is at your service.

We shall be glad to have one of our expert electric railway lubrica-

tion engineers cooperate with your operating personnel. This cooperation will insure you the full value of Gargoyle Lubricating Oils when in service on your equipment.

If you wish to know what specific economies the Vacuum Oil Company effected and is effecting

> on street railways throughout the world, kindly address nearest branch office.



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A grade for each type of service

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THE ARNOLD COMPANY

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ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

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Design, Construction Reports, Valuations, Management

NEW YORK PHILADELPHIA CHICAGO

J. N. DODD

614 Hall of Records, New York, N. Y.

Planning and Equipment of City Rapid Transit Lines Special Investigations

Electric Railway Journal LIX: 21:853

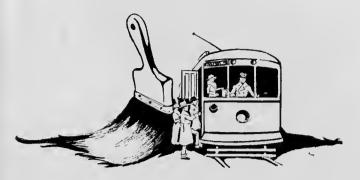
Our text this week:

"An attractive car is an efficient salesman"

In a striking editorial with this title, Electric Railway Journal said (Page 853, Vol. LIX, No. 21)

"The general appearance of both the exterior and interior of cars should therefore be kept in a condition pleasing to present or prospective riders. The chief engineer of one of the largest electric railway properties in this country recently remarked that he had found a wellpainted car kept in good condition . . . to be so good an advertisement that it increased the riding sufficiently to pay for the additional expense necessary to keep it in this condition."

i. e. Paint sells transportation.



Beyond doubt the use of well-groomed cars is one of the most effective plans electric railways have developed to increase short-haul traffic.

An ambitious painting program, designed to increase traffic, calls, however, for the products of a Car Finish Specialist.



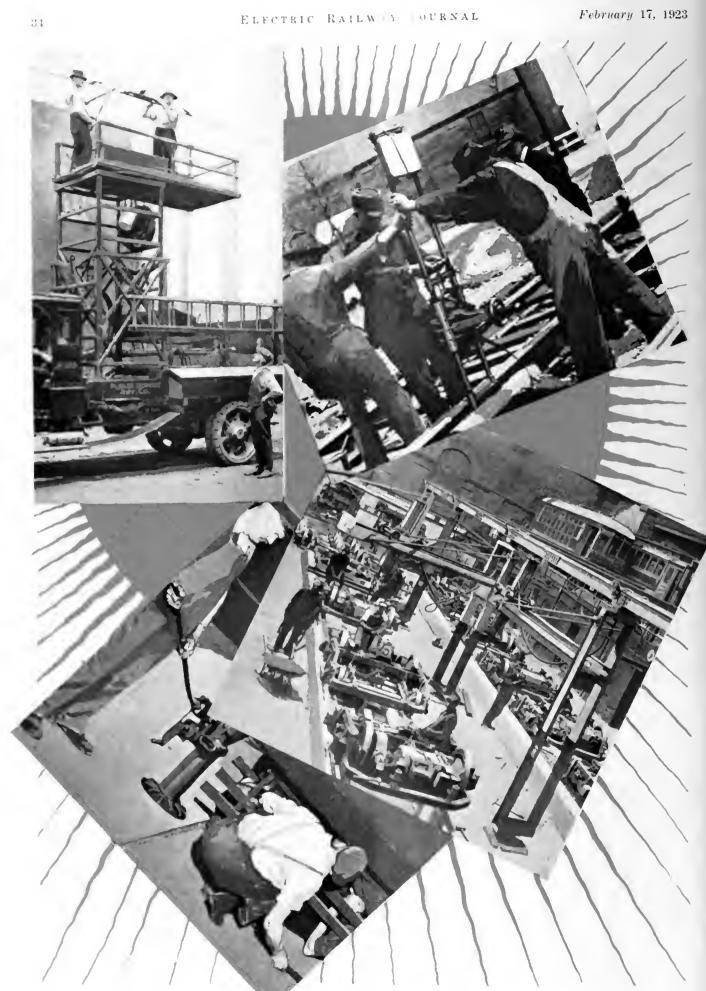
Beckwith - Chandler Car Finishes fit into modern carpainting practice. They are made either for spraying or brushing, whether you use the flat color and varnish system, or use enamel, or use the color varnish system, Beckwith-Chandler products do the work and give you a bright finish that stays bright.

All are backed by long electric railway experience. Remember that bright, newly painted cars help the job of selling transportation.

Let us get together to sell more rides.

The Beckwith-Chandler Company
320 Fifth Ave.
New York

Company
203 Emmett St.
Newark, N. J.



Millions for Maintenance

Power, track, line and equipment are due for the biggest overhauling they've had for years. Expenditures for this year's maintenance will exceed

\$200,000,000

This sum does not include the replacements which will be made where replacement is more economical than maintenance. Nor does it include the new labor-saving machines, tools and equipment needed to do the maintenance work more efficiently. Purchases will include everything for the complete

REHABILITATION

of power plants, substations, transmission lines, overhead construction, track, rolling stock, shops, buildings and structures.

The men whose words will determine who is to get the orders are used to depending for information regarding machinery, materials, equipment and supplies on the

Annual Maintenance Number Electric Railway Journal —

What would you like to have these men know about you?

Tell them and tell them BIG

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SHERMAN



In Order To Succeed

One of the urgent industrial problems is to develop a constructive attitude of mind on the part of employees, especially transportation employees.

A constructive viewpoint in the mind of individual members of your organization will not take root or grow of its own accord.

The only solid foundation for straight thinking and wholehearted cooperation is practical education of employees by making available the vital facts pertaining to the industry as it relates to employer and employees.

In order to succeed, this education must be carefully planned. It is necessary that *more* than letters, bulletins, printed matter, lectures, etc. be used.

The employee must be appealed to in language which he will understand, and through methods which he will grasp and appreciate.

"The Viewpoint of the Employee Is the Most Neglected Asset in Industry"

SHERMAN SERVICE INCORPORATED

Industrial Co-ordination

Production Engineering

John & Sherman

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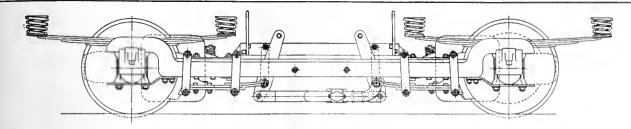
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The leading electric railway companies of this country request Gould Slack Adjusters on their cars. They know that their automatic operation can be depended upon to always keep the brake rigging taut. They also know that the cost of Gould Slack Adjusters is soon saved by reduced wear on brake shoes and lower air consumption for braking, less labor cost and fewer accidents.

Write for full particulars in connection with our types A, B & C adjusters made for every style of car truck.

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The Most Successful Men in the Electric Railway
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ELECTRIC RAILWAY JOURNAL

Every Week



COMPACT EMERGENCY DRESSINGS

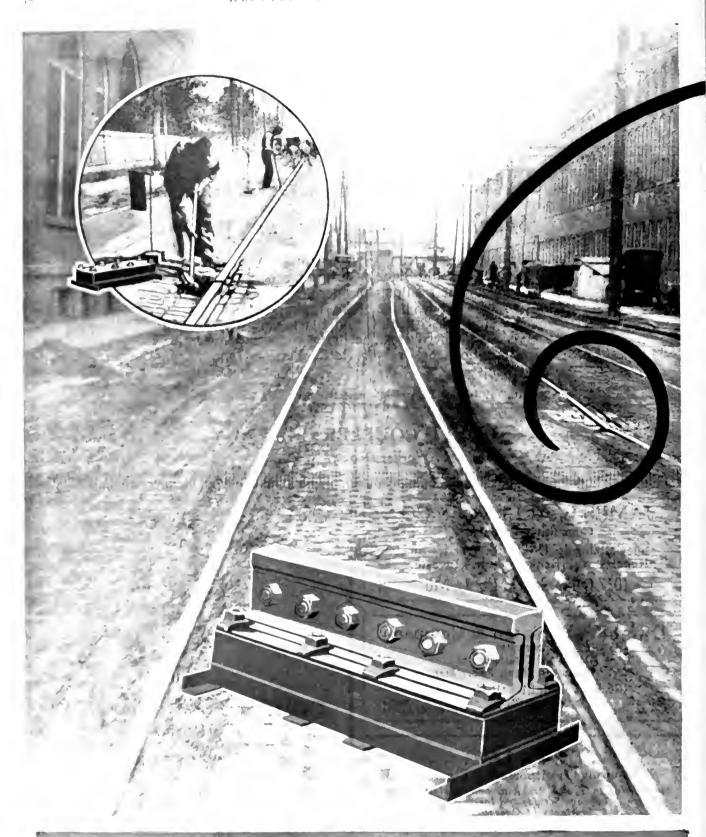
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Each little packet contains a complete Surgical Dressing, sterilized, sealed, ready for instant use. Compact Emergency Dressings are modern, efficient, economical.

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Send for it today

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DAYTON



'A stitch in time saves nine"

Something has to be done—Why not Resilient Joint Boosters—they add many years of service to the life of track with bad, fallen joints and eliminate further track and paving repairs—they cost only slightly more than "temporary repairs" and they can be put in without interruption to traffic.

A comparison of the two tracks on the opposite page shows what can be done by using Dayton Joint Booster for reclaiming old track.

DAYTON The North of Rail Joint She sook that Booster The poen yield Booster

The greatest wear of all on ties, on rails and on rolling stock comes at the rail joints.

And it is just here that the principle of the Dayton Mechanical. Tie and the Dayton Joint Booster obtains its greatest justification.

For, in both the specially designed Mechanical Joint Tie for use under joints in new track construction and in the Dayton Rail Joint Booster, used to build

up fallen joints in old track, the cushion provided takes up all the jar and hammer of traffic, thus preserving the foundation.

For years this Joint Booster has given the utmost satisfaction in numerous locations — proving not only extremely economical to install, but saving maintenance charges from the start.

Order Boosters today and you will become a Booster tomorrow.

Resilient JOINT BOOSTER

THE DAYTON MECHANICAL TIE CO.

708 Commercial Building

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Electric Railway Journal

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The membership of this publication in The Associated Business Papers, Inc., means that it has achieved an exceptionally high publishing standard, and has subscribed unreservedly to these—

STANDARDS OF PRACTICE

The publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself—

- 1. To consider, first, the interests of the subscriber.
- 2. To subscribe to and work for truth and honesty in all departments
- 3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
- 4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"

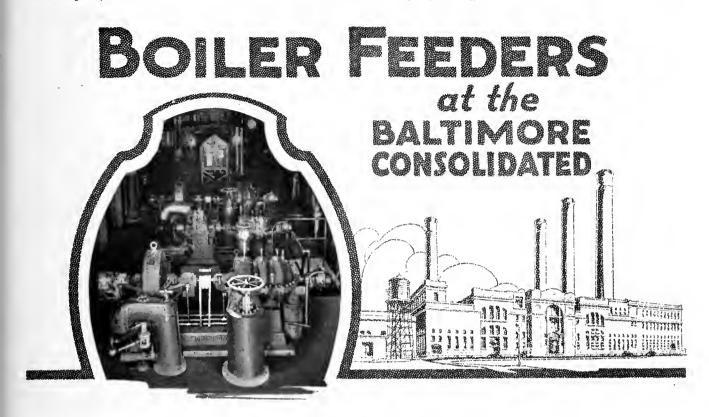
- 5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
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- To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements, subject to proper and authentic verification.
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- 9. To avoid unfair competition.
- 10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

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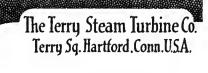


Power Co. of Baltimore, Md., with Terry turbines dates back as far as 1911, when two 160-hp. turbines were installed for driving gas blowers. Since that date nine Terrys have been added for driving pumps, five of which are used for that most vital service—boiler feed; and twelve turbines for driving geared forced draft fans. This total of twenty-three turbines, installed a few at a time, year by year, is conclusive evidence of their desirability and satisfactory operation. When selecting the driving element of your power plant auxiliaries, if you follow the advice of the majority of engineers in the oldest and the established central stations in the United States you will choose

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Instead of a hig-coarse threaded jam not that needs a two-fisted wrench for application you require only a pocket size wrench that is applied at a convenient angle. The secret? The Jam-nit idea is replaced by a split clamp with a spring power that win's be loosened once the little nut on the sule has been tightened

This new turnbuckle will last as long as the truck, because-

It's Boyerized!



Pin the Double-Cross on Old Man Wear-and-Tear, with this—

There's no argument to it!

"Boyerized" steel will outwear (by three or four times, mind you) any other metal which can be used for standing the heavy strains and sudden shocks to which car parts are subjected. his total or to the side

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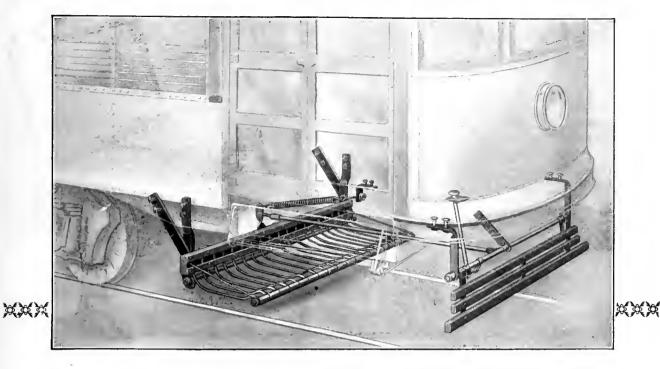
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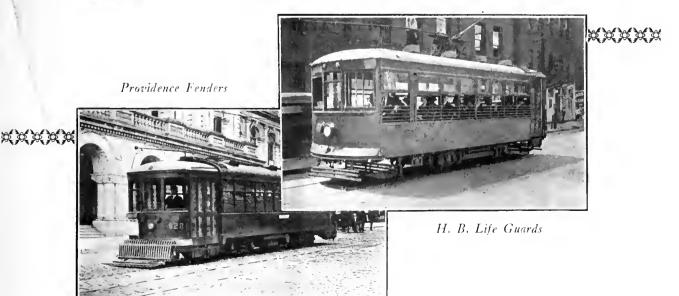
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BEARINGS: "Tiger" Bronze
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HARPS:

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MORE-JONES BRASS & METAL CO.
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QUALITY PRODUCTS

If 14,000% worth of brand new gears salvaged from scrap by "Jool Steel" WISDOM TOOTH pinions.

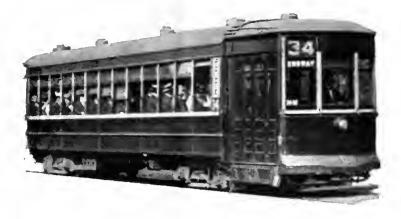
Here's the story: A large elevated railway line had had so much trouble with pinion breakage, (they had tried every manufacturer), that they changed from the standard tooth shape to a 20° stub for strength. In making the change, they discarded \$14,000.00 worth of brand new gears, mostly "Tool Steel," because the gears had the old tooth shape and would not interchange with their new tooth. They were afraid to use the gears with any make of pinion because they would surely have occasional breakage.

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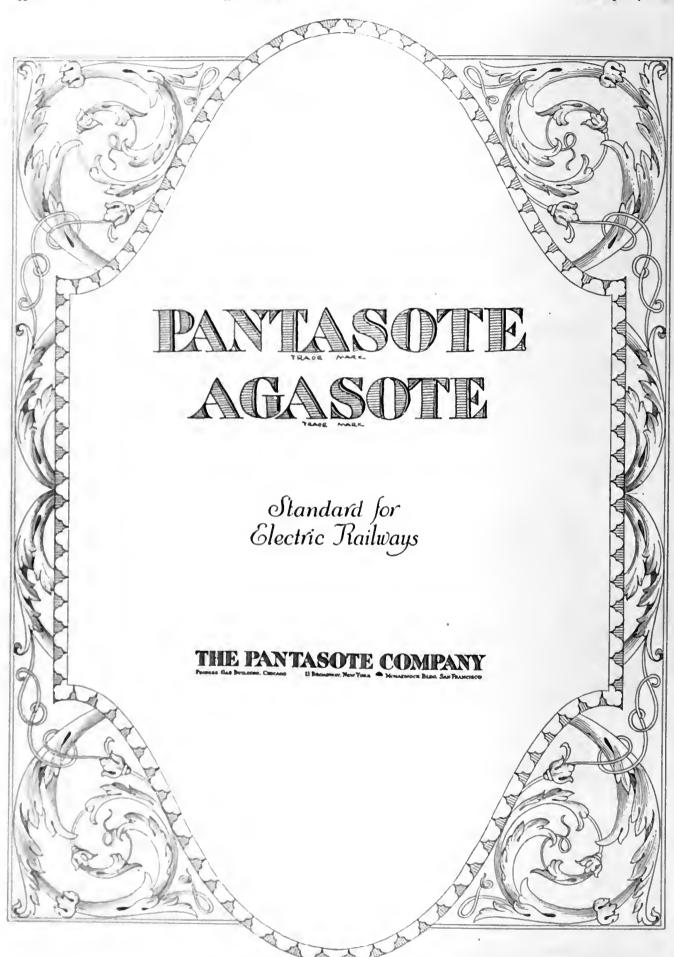


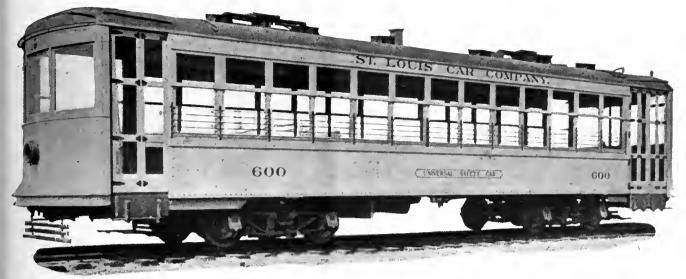
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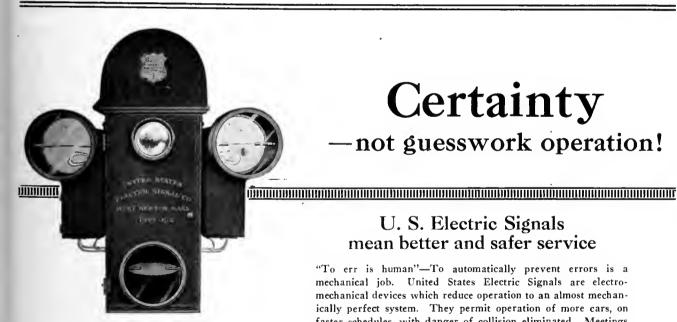
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NEMBEA

The porcelain strain clevis shown here is practical and convenient for a wide variety of overhead applications. Practical construction men have received this Drew design enthusiastically and are using it in

design enthusiastically and are using it in all kinds of overhead work. One lineman has said that "it holds up everything but your sox."

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No. 7520 is strong enough for any overhead use, gives ample insulation, and saves time and money by its convenient size and application.

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No. 7520 Porcelain Strain Clevis

ANDERSON LINE MATERIAL



Aetna Insulation

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Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

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It's easy to handle; quicker, cleaner and does a better job. Get away from the disagreeable, inefficient and often dangerous method of hand application of creosote oils. Deeper penetration is gained, and the material is spread more smoothly. The Dayton Air Brush is the one which spreads the material exactly where you want it—it does not throw it broad cast or waste it. It may be used with equal efficiency whether poles are in the ground or piled up in your storage yard.

Write for full particulars.

The Dayton Air Brush Company

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20 new steel cars for the Chicago, Aurora & Elgin Railroad

The specifications include

EDWARDS

Trap Doors and Window Fixtures



Compressor Brake Device

The following items of Edwards equipment are called for—

Edwards Sash Locks, Style 13 Edwards Compression Devices Edwards All Steel Trap Doors. Edwards Trap Door Catches

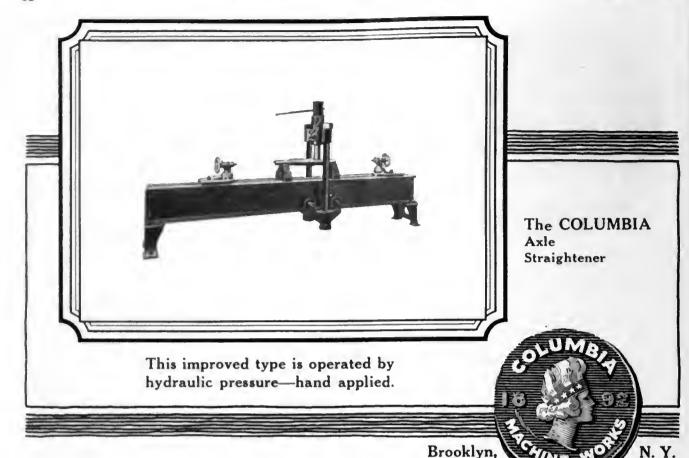
Order them for your cars

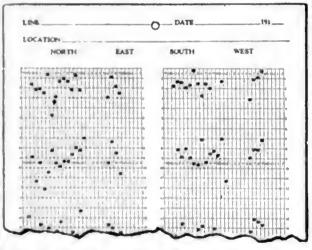
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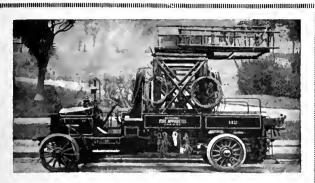


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Increase your returns by improving the service on which they depend. The cars themselves mark their time on the daily chart of the Nachod Automatic Headway Recorder—a record of operation for the superintendent, easy to read and file for reference. The chart shows how late or early the car is according to schedule. The Recorder points out irregularities and "slack" in the schedule. An instrument with many uses—an efficient tool for the careful manager. Write for Recorder Manual, Nachod Signal Co., Inc., Louisville, Ky., Manufacturers of Block Signals and Highway Crossing Signals.

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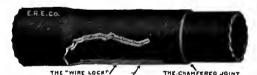
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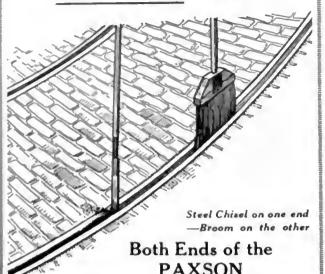
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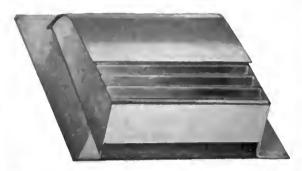
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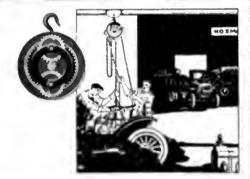
Concrete Trolley Poles

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Massey Concrete Products Corporation Peoples Gas Bullding, Chicago



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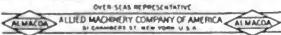


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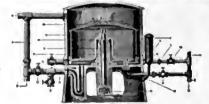
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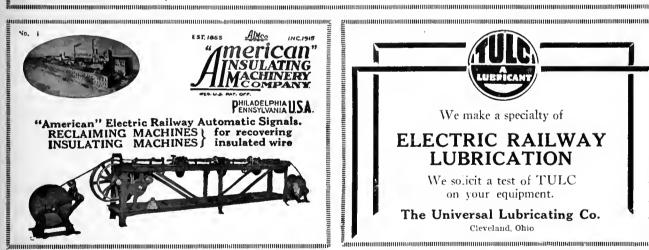
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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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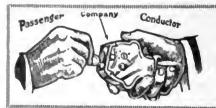
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AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

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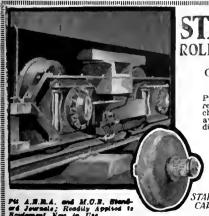
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Prevent hot boxes and resulting journal troubles; check end thrust and do away with all lubrication difficulties BECAUSE—

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Guaranteed Two Years.

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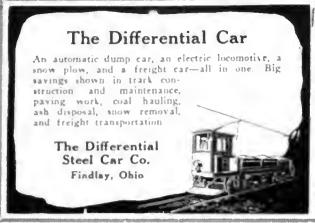
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The trolley wheel with the high mileage side bearing

Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. Investigate them.

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The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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Grade 203, produced by research and proved by test, the most satisfactory and lowest cost-per-car-mile brush obtainable for A. C. commutator type railway motors. One of a series of standard railway motor brushes.

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Apply the advantages of the staffless brake with its space-saving features, to all your cars. Ackley No-Staff Brakes are adaptable to any kind of service. The eccentric chain-winding drum insures quickest applications and maximum power.

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DRAFTSMAN wanted by a manufacturer of special track work in the East, Must be thoroughly familiar with designing and detailing both steam and street constructions. P-501, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa

DRAFTSMEN calculators wanted on special track work. With or without experience but must have thorough working knowledge of mathematics. P-518, Electric Railway Journal, Real Estate Trust Bldg., Phila. Pa.

TRACK foreman for a street railway in Southern New Englannd. Should be experienced in handling large force of men on construction and maintenance work including installation of special work. State age, experience and salary expected. P-522, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

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MASTER mechanic desires position on smail city or interurban property. I am at present employed and can give good references. PW-506, Elec, Ry, Journal, Old Colony Bldg., Chicago, Ill.

ASTER mechanic desires position. Twenty years' experience on city and interurban properties in shop work and maintenance of way. Good references, Central West or Western States preferred. PW-515, Electric Ry. Journal, Old Colony Bidg., Chlcago, Ill.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campalgns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-520, Eiec. Railway Journal, Leader-News Bidg., Cleveland, Ohio.

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A good second-hand, at moderate price, large enough to turn down car wheels 34 in, in diameter. Address.

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4 One-man

DOUBLE TRUCK

Latest Type—3 Years Old

Built by Brill-Arched Roof-folding doors and steps-Cross seats seating 48, Mahogany Interior, Consolidated Heaters, 44 ft. long 8 ft. 2 in. wide, Brill 77 E1 Trucks, 5 ft. 10 in. wheel base; 41/2 in.-5 in. axles, small wheel -Westinghouse 514 A Motors, 2-K35 G Controllers, Westinghouse Air Brakes. Weight about 3200 lb.

> Built in 1919 Condition Practically New

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On Account of Changing Frequency

2-1500 kw., 25 cy. Turbo Generator Sets, with surface condenser.

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Complete Equipment **Embracing**

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15,600 ft. on Reels 150 ft. to 450 ft. Price per foot 80 cents.

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BUFFALO HOUSEWRECKING & SALVAGE CO. Buffale, N. Y.

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Weight Complete, 33,000 lbs. Seat 53, 4—G. E. No. 258-C Motors, K-12-H Control, West. Air Taylor Trucks, R.H. Type. Complete,

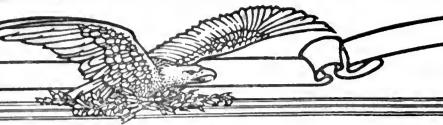
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

"Opportunity" Advertising:

Think "SEARCHLIGHT" First!

February 17, 1923 Electric Railway Journal

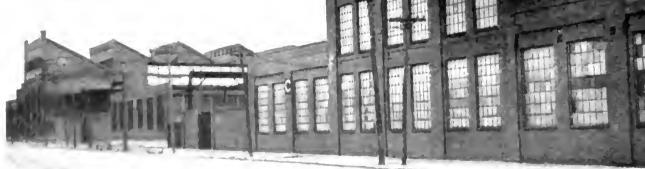






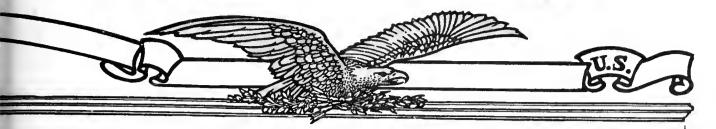


Types left exists and Types right Gantry same and appropriate has been an Bulga V and B falses fright V. B and a from frost o. Ewelith at 4 Bulg in foreground



WAIR

DEP



Does your production demand a new plant?

Here, then, at Erie, Pa., is a proposition worth considering

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Property consists of: Three brick, steel and concrete buildings, 720 ft. x 129 ft. 9 in., 600 ft. x 75 ft., 640 ft. x 150 ft: brick, frame and steel additions, 520 ft. x 100 ft. 4 in.; brick, steel and concrete additions, 210 ft. x 34 ft.; bond house, 200 ft. x 27 ft.; office, 39 ft. x 27 ft.; time house, 71 ft. x 41 ft.; boxing room, 80 ft. x 22 ft. Improvements consist of adequate spur tracks, Gantry cranes, steam power plant, electric substation, engine room and such equipment as air and oil tanks, compressors, generators, motors, etc.

For terms of sale, itemized statement of improvements condition of property, etc., write at once to the office of the Quartermaster General, 1018 Munitions Bldg., Washington, D. C., or Samuel T. Freeman & Co., official auctioneers, 1519 Chestnut St., Philadelphia, Pa. Inspection of property can be made on application to Commanding Officer on the premises.

The Government reserves the right to reject any or all bids.



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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Paving Breakers were designed specifically for cutting asphalt and breaking up concrete

Their application has been extended to include tearing out concrete and masonry foundations and walls, removing slag from reverberatory furnaces, dismantling concrete ships, taking up concrete floors and various other types of demolition work.

Removing 14,175 cu. ft. of concrete in 306 hours

The Puget Sound Power and Light Company, Bellingham, Washington, wanted to remove a piece of street railway track 2430 feet long in the shortest possible time. This involved the removal of

Two "Paving Breakers" were put on the job. They operated continuously twenty-four hours per day for 306 hours and completed the job. The average rate of removal was 23.16 cu. ft. per hour per machine. The total labor cost was \$777.24, that is \$2.54 per hour or 5.48 cents per foot of concrete removed and placed on the bank of the trench.

Data from various jobs shows that when working in gangs of three or four using hand hammer and chisel methods, each man averages about 5 cu. ft. per hour. It would require 74 men per shift using hand methods to do the above job in 306 hours elapsed time, as against five men per shift with Paving Breakers.

> A copy of Bulletin No. 4051 completely describing "Paving Breakers" will be sent you upon request.

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Detachable Trolley Harps

Trolley wheel mileage can be increased and service interruptions reduced when Bayonet Trolley Harps are used. They permit removal of wheel and harp for inspection, lubrication, adjustment or repair. The change is made in a fraction of a minute—no tools needed.

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USE LE CARBONE CARBON BRUSHES

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ALPHABETICAL INDEX TO ADVERTISEMENTS

Page	Page	Page	Page
Ackley Brake & Supply Corp. 60 Alax Metal Co. 67 Alite-Chalmers Mg Co. 67 Allite-Chalmers Mg Co. 67 Alliton & Co. J E. 37 Amer Brake Shoe & Fity. Co. 50 American Car Co. 60 American Electrical Works 53 American Insulating Machinery Co. 57	E Earli, Chae. I	K Kuhiman Car Co	Rail Welding & Bonding Co. 21 Ramapo Alax Corp. 55 Richey, Alberl S. 32 Robinson & Co., Dwight P. 37 Rochling's Sons Co., John A. 54 Rome Wire Co. 53 Rooke Automatic Register Co. 58
American Battan & Reed Mfg. Co. 50 American Steel & Wire Co	F Feustel, Robt M 32 First Ald Specialty Co 35 First Ald Specialty Co 55 Ford Bacon & Davis 32 Ford Chain Block Co 56 'For Sale' Ads 01	M McCardell & Co	Salety Car Devices Co. 6 St. Louis Car Co. 49 Sameon Cordage Works. 59 Sanderson & Porter. 32 Scarchlight Section. 61 Sherman Service Inc. 36 Smith & Co., C. E. 32 Smith Heater Co., Peter. 58
В.	11 02	Morton Mig. Co	Stafford Roller Bearing Car Truck Corp
Balemeit & Wilcox Co	G Galena-Signal Oil Co	Nachod Signai Co., Inc. 52 Nashville Tie Co. 54 National Bruke Co. 29 National Carbon Co. 69 National Frieumstic Co., Inc. 15 National Railway Appliance Co. 60 New York Switch & Crossing Co. 55 Nichols-Lintern Co. 56	Standard Steel Works Co
	llais & Kilturn Corp . 44 "Help Wanted" Ade . 61	Nuttall Co., R. D	Transit Equip, Co 61
C Cameron Electric Mfg Co	Hemingray Glass Co. 53 Hemphill & Wells 32 Heywood Wakefield Co 58 Holst Englehardt W 32 Hubbard & Co 54	0 Ohlo itrass Co	U U. S. Electric Signal Co 49 Universal Eubricating Co 57
Collier, Inc. Barron G. Front Cover Columbia M. W. 4. M. 1. Co 52			v
Consolidated Car Fember Co. 43 Consolidated Car Heating 26 Copper Products Forging Co. 67	initianspolts Switch & Frog Co., 57 Ingersoll Band Co 65	Page & Hull Co12, 13	Vacuum Oii Co30-31
	International Creceoting & Con-	Parsons, Klapp, Brinckerhoff &	W
Day & Zimmerman, Inc	etruction Co International Register Co., The, 58 International Steel Tie Co., 8-9 Irvington Varnish & Insulator Co. 56	Douglas 32	"Want" Ads. 61 War Department 62-63 Wason Mig. Co. 69 Westinghouse Electric & Mig. Co. 4 Westinghouse Traction Brake Co. 5 Wharton, Jr., Co., Wm. 54
Domest & Co . 52	Jackson, Walter 32	R	White Engineering Corp., J. G., 32 Wish Service, The P. Edw., 88
Drew Rice & Mig Co . 61 Dram & Co., A L	Jeandron W J 67 Johnson Fare Box Co 58	Railway Track-work Co . 24 Railway Utility Co	Wood Co. Chas N 53

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Sole Manufacturers "HONETCOMB" AND "ROUND JET" VENTILATORS for Montier and Arch Roof Care and all classes of buildings; slee ELECTRIC THERMOMETER CONTROL of Car Temperatures

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New Light-Weight High-Speed Cars Will Offset Interurbans' Competition



Saving in Power and Maintenance and Increased Receipts Improve Conditions



The Western Ohio Railway Company's experience with light-weight cars in interurban service should serve as a guide to other high-speed lines feeling the competition of other means of conveyance and the necessity for lower operating costs.

After four months' operation, available data indicates that reduced operating costs and increased receipts have resulted, and that this company will be able to successfully meet competition and provide a service which

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While weighing only 33,000 lbs. complete, these new cars built in our Kuhlman Plant have been satisfactorily operating as high as 53 m. p. h. and from recent reports "ride perfectly at any speed."

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Information in detail furnished upon request to



In 1923

More interurbans will adopt lighter cars



-and Down go Costs of Power and Maintenance

Light-weight cars on many interurban roads are effecting savings which prove the economies claimed for light-weight car operation.

On one property in the Middle West seven light-weight interurban cars, put in service 4-1/2 years ago, have saved that company \$175,000—nearly \$40,000 a year.

This was one of the first roads to see the advantages accruing from lighter weight. Many others have followed, and still others are considering the possibilities of reducing costs in this way.



Have you compared your operating costs with these records?



MORTHBY MUNICIPALATION ISSUE

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High-Grade Protection Type K-3 Lightning Arresters

For Car, Line and Station Use 100-1500 Volts Direct Current

This arrester should be used where local lightning conditions are such that a higher degree of protection is justified than is afforded by the inexpensive Westinghouse Type MP Arrester.

Type K-3 is a dry-type arrester and stays on the cars the year round

It handles on transient energy on the line, and does not allow any power current to pass, thus the Type K-3 Arrester does not cause any surges in the circuit, as do arresters that have to break heavy power arcs after each discharge.

About five arresters per mile are recommended for line protection, and one or two to each car. It can be mounted on top or under the car.

er and round WESTINGHOUSE ELECTRIC

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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CONTENTS

Editorials
Careful and Systematic Maintenance Is a Paying Investment
The Science of Babbitting Bearings
Painting Methods for Electric Railway Rolling Stock323 An analysis of the various painting methods used by electric rail- ways shows the three principal systems consist of flat color and finishing varnish, color varnish and finishing varnish, and the enameled finish.
North Branch Transit Company Rebuilds Cars327 Ten cars are being reconstructed for one-man operation. Trucks are rebuilt, wheelbase lengthened, and the car bodies are provided with arch roofs and are otherwise rebuilt on modern lines.
Changing from 25 to 60 Cycles
Method and Cost of Reclaiming Seattle Paved Track329

A detailed account is given of the organization used, which was designed to foster competition and insure good work. Reclamation work was done by shipming solid acquired to detail the work was done by shipming solid acquired to detail the state of the

tion work was done by snimming solid against old foundation.
Equipment Maintenance Notes
American Association News341
Association News and Discussions341
News of the Industry
Financial and Corporate
Traffic and Transportation
Personal Mention
Manufactures and the Markets353

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What Subscribers Think of the M. M. I.

Monthly Maintenance Issue Was Started for Just This Reason

"In my opinion the foreman has been overlooked by publishers as well as manufacturers, to a large extent. The foreman is in a position to test the manufacturers' goods, and on a small property, the quality is usually accepted or rejected by him."—J. J. C., Foreman of Mainte-

This Idea Was in Mind, Too, When We Started the M. M. I.

"I find the shop notes the most interesting because I am directly connected with the maintenance of cars. I also like to see what the other fellow is doing to make a job easier or better. I find it is the very best journal of its kind. I would not do without it. The only thing I would suggest is that the parts I mentioned above be enlarged a little."—J. G. B., Carhouse Foreman.

This Received Immediately After the M. M. I. Plan Was Announced

"The right move for bettering the journal has already been announced in today's issue."-W. C. W., Foreman Light & Signal Department.

Approves Plan of One Issue a Month on Maintenance

"Reports and details of the various conventions have been very helpful and I feel that devoting one issue per month to maintenance is a move in the right direction."—J. W. H., Foreman.

There Is a "Maintenance of Equipment" Department in the Other Three Issues, Too

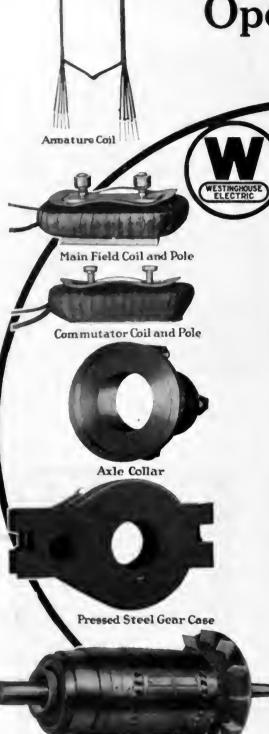
"It is our opinion that you are adopting an excellent plan in printing a 'Maintenance Number' once each month. We think this will be much more beneficial than including miscellaneous maintenance articles in the several regular issues and editing but one maintenance number each year, as has been your custom."—A. W. E., Superintendent Railway Equipment.

Keeps One in Touch with New Appliances

"All articles in the ELECTRIC RAILWAY JOUR-NAL are very interesting. Even the ads are not only interesting but instructive. The paper keeps one in touch with new appliances that we might not hear of or see if it were not for your journal. You certainly keep up with the times and every new article is a trifle more interesting than others we have read."—J. W., Superintendent.

4

Operating Insurance



Complete Armature with Fan.

A Well-Stocked Storeroom –

is the most economical form of Railway Operating Insurance.

Your first thought in obtaining this insurance is, "What renewal parts should be bought to derive the most benefit?"

Your second thought will be, "What quality should be demanded to obtain the most service?"

If you give this subject the attention it deserves, you will consider:

- 1. The loss of revenue owing to laid-up cars due to lack of stock of renewal parts.
- 2. Additional maintenance expense caused by poor material and poor workmanship.

Then you will arrive at this conclusion:

"Westinghouse Renewal Parts for Westinghouse Equipments."

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse



Brake Cylinder Packing Cups

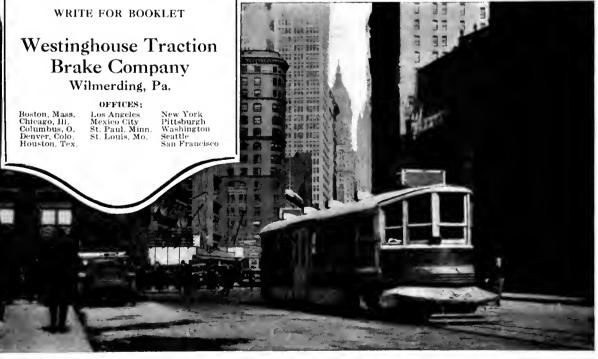
WABCO is the new brake cylinder packing cup material which has revolutionized the packing cup industry.

Until Wabco was discovered in the Westinghouse laboratories, such efficient and economical service as this product has since been giving was unknown.

Wabco Packing Cups have practically banished brake cylinder leakage, resulting in better air brake performance with reduced labor, and less wear, on the part of the compressor.

Wabco is so constructed as to be virtually indestructible and lasts for years under average conditions.





WESTINGHOUSE TRACTION BRAKES

Insurance plus Marsh & M-Bennan Service

Additions and Betterments

When plans are taking shape for additions and betterments, you can profitably employ the services of Marsh and McLennan engineers.

They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

Business executives of many of our large corporations have used this service profitably.

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Minneapolis New York Detroit Denver Duluth Columbus San Francisco Seattle Cleveland Winnipeg Montreal London

Keep the curves where they should be with O-B Pull-overs



O-B Pull-Over with O-B XH Strain Insulator



O-B Pull-over with O-B Wood Strain

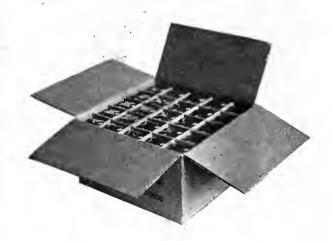
Sturdy O-B Pull-overs hold the trolley wire to its place. They are made of malleable iron in husky "I" section. O-B Sherardizing shields them from weather.

Furnished for single or double pull-off construction.

O-B XH Strain Insulator

Many railway men have discovered that high-tension porcelain pays on low voltage. And, more particularly, that O-B XH Insulator is the strain insulator that does their work best.

Made in two sizes. Packed, for convenience, in cartons which are easy to stock and handy for the tower wagon.



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New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France c Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators rust-resisting STRAND



WIRE corrodes on account of chemical and physical differences within the metal.

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.

The extra galvanized coating on Page-Armco Strand combined with the purety of the wire insures maximum service.

Page-Armco Iron Strand is used as messenger strand, guy wire or strand, telephone wire or strand, trolley span wire, ground wire or strand, telegraph wire, and as power transmission conductors.



Page Steel and Wire Company

Bridgeport, Conn.

District Sales Offices: Pittsburgh Portland, Ore.



San Francisco

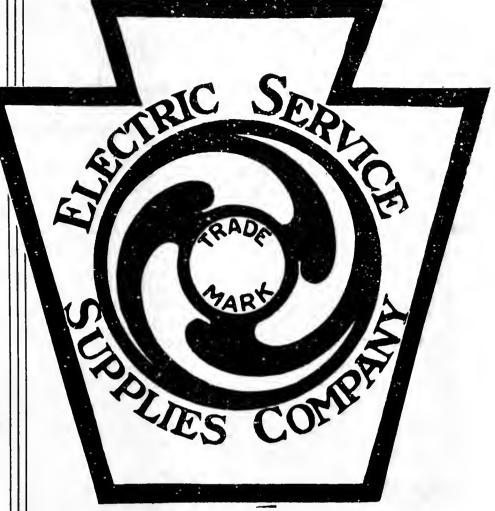
MANUFACTURERS OF

Rods—Armco Ingot Iron and Special Analysis Steels.

Wire—Plain and Galvanized — Spring, Rope, Telephone, Telegraph, Bond, Strand, Oxyacetylene and Electric Welding Wire.

Fence—Woven Wire for Farm and Rallway Right of Way, Wire Link Protection for Industrial Plants, Lawns, Sohool and Estates, and Factory Partitions

PAGE-ARMCO INGOT IRON GALVANIZED STRAND



A sign for the better

The Keystone trade mark has meant for years all that is best in the way of electrical equipment and car specialties. When you specify any product bearing this special Keystone design you can rest assured you are ordering something that passed the experimental stage years back.

Some of the Car Specialties sold under the Keystone name are listed in the panel. You will find some of them on nearly every car operated today. You will find all of them on many cars. You, too, should be using all of them. Maybe you would like the complete set of data sheets. How shall we address them?

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- Colden Glow Headlights
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- E Kevetone Air Valves
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- Automatic Door Signals
- Standard Trolley Harps
- Standard Trolley Wheels Keystone Trolley Line Material
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Poles of Long Life/

Long-Bell Poles are treated, full length, with the best grade English Creosote Oil by the pressurevacuum process. This treatment makes them resistant to decay, fire and other destructive elements —insures long life. Of Long Leaf Yellow Pine, they possess unusual breaking strength. Long-Bell Creosoted Yellow Pine Poles can be depended upon to properly support all wire lines. Many public utility companies are now using Long-Bell Poles for city distribution. They add to the appearance of any right-of-way. As evidence of our confidence in these poles, each is branded "Long-Bell" five feet above the ground line.

Get further information! Send for "Poles That Resist Decay", our Booklet that fully explains Long-Bell Creosoted Yellow Pine Poles.

The Long-Bell Lumber Company

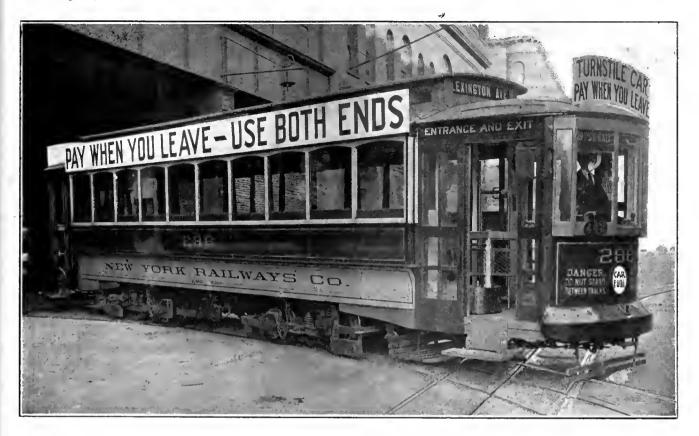
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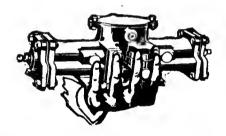
Creceoted Yellow Pine Polee; Highway Guard Rails and Fence Posts; Timbers, Lumber, Piling and Wood Blocks.

Ipng-Bell

Creosoted Yellow Pine Poles



"Use Both Ends" with one-man operation



An old style, wide platform, two-man car converted for one-man operation in the husy streets of New York is shown above. It is arranged to handle boarding and alighting passengers and fare collections practically as fast with one man as formerly with two. This interesting experiment of the New York Railways Company was described and illustrated in the *Electric Railway Journal*, Dec. 30, 1922.

From his post at the front end, the operator has been given complete control over passenger entrance and exit at the rear end by means of turnstiles and National Pneumatic Door Engines and Door Control.

NATIONAL PNEUMATIC EQUIPMENT

is adapted to the widest variety of conditions for reducing platform labor, saving time, and increasing safety. Let us figure with you and see which of these devices are required by your service.

Door and Step Control Motorman's Signal Lights Door and Step Operating Mechanism Safety Interlocking Door Control

Multiple Unit Door Control

Manufactured in Canada by

Dominion Wheel & Foundries, Ltd.

Toronto, Ont.

National Pneumatic Company, Inc. Principal Office: 50 Church St., New York

Philadelphia—Colonial Trust Bldg. Chicago—McCormick Bldg. Works—Rahway, New Jersey

Capitalize Time Saving

Recently a large electric traction operation in the Middle West equipped a few of the conductors with JOHNSON UNIVERSAL CHANGERS with a found result—that they are furnishing all conductors on their system with these changers.

The principal reason for this company adopting this equipment was the time saving effected in passenger loading at stops.

Measured in seconds—What does it mean?

Assume: Basis

100 Cars100 Miles per car per day5 Stops per car miles1 Second per stop saved

Time saved per annum—5080 (car) hours

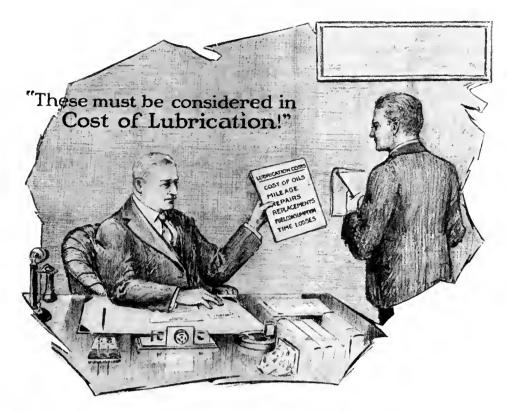
The use of our changers in service has proven conclusively that they afford the instrument for saying time—speeds up schedules—makes schedules more flexible—makes work of changing money sure and easy—standardizes and simplifies

A GOOD INVESTMENT

Place your orders for this worth-while equipment and realize immediately these advantages. The savings per annum will pay several times for them.

JOHNSON FARE BOX COMPANY

4619-25 Ravenswood Ave. Chicago, Illinois



The Wisdom of Experience

Practical executives know that lubrication means something more than the purchase of so many gallons of oil.

Likewise that the "cost of lubrication" may not be limited to the purchase price of the oil, but must be found by checking the service results obtained.

Every dollar of expense in repairs, extra labor or depreciation in equipment that becomes necessary through inability of the oil to furnish proper and adequate lubrication, must in justice be added to the first cost of the oil to ascertain final, or true cost of lubrication.

An analysis of actual service results has often revealed the fact that the supposed saving made through the buying of cheaper oil has been lost many times over in expenses incurred through the oil's shortcomings.

Galena Lubrication Service has never failed to demonstrate its ultimate economy in mileage, reduction of repairs and time losses, preservation of bearing parts and all 'round lubricating efficiency. The matchless service it is now furnishing to more than five hundred electric properties is convincing proof of its ability to deliver the most lubricating value for the dollar of cost.

"More miles to the pint;
Better service to the mile!"



In dealing with the problems of brush application, knowledge of the motor counts highly



General Office Schenectady, NY. Company Sales Offices in all large cities

them your problem?

specialists are well equipped. Why not submit to

ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, Editors

Volume 61

New York, Saturday, February 24, 1923

Number 8

Spray Painting Produces a Satisfactory Economy

THE use of spray painting equipment is increasing rapidly and can no longer be considered as an experiment. There are many places in connection with the maintenance of electric railway equipment where this method of painting shows marked economies. Its economy and convenience for use in reaching inaccessible places can readily be realized. For painting the small car parts outside of the body, such as fenders, trucks, car screens and coupler and other fittings, it may be used to apply a satisfactory coating with economy in both time and labor. After rattan seat cushions have been scrubbed and cleaned, the usual coating of varnish can be applied with a spray gun, avoiding slow, fatiguing manual labor and greatly speeding up the process.

Many different types of spraying nozzles are now on the market. These are arranged so that the size of spray can be conveniently adjusted to either a concentrated flow or a wide fanlike spray as desired. Spraying nozzles are available that can be used with nearly all fluids, ranging from the thinnest shellac to the thickest enamel. No doubt the greatest lack of interest in this development comes from the old school of painters, who take particular pride in producing an artistic job and who appear to derive special pleasure from the wielding of a brush and the smoothing in of the various coatings. There also appears to be quite a general impression that spray painting is uneconomical in the use of material. This latter, however, has not proved to be the case where proper equipment is used with care.

Several companies which are using spray painting quite extensively report that they find it much more economical than the brush method in the amount of material used. This economy comes from the fact that there is no loss of paint by drops or "slop" of the brush and that spray painting is accomplished without any lap or brush mark which requires rebrushing and the use of additional material. Spray painting covers the surface smoothly and evenly without streaks, fatty edges or brush marks. Also, there is less likelihood of skimped places or thin edges at corners, as the points where these usually occur by the brush method can be handled with the spray gun without any particular skill or effort on the part of the painter.

The majority of electric railway painting requires that the painting outfit must be brought to the job, and in this connection many outfits have been developed which are readily portable. Provision has also been made for different sizes of paint containers, which can be installed in the larger receptacle so that where different colors are used a small amount may be mixed and applied without the necessity of filling a large container. Where the painting material is quite thick air agitators are provided to keep the solid matter in suspension.

Railways which are now using spray painting find that it produces good results where the men are convinced of its merits. When once introduced its extension to a large variety of operations is easy. This applies not only to rolling stock but to the painting of poles, fences, signals, shelter buildings, and other property out on the line.

Play with the Company that Wants You to Grow

In ALL industries there is at present great activity with regard to the development of employees. Such work has been going on for many decades, but the modern tendency toward large aggregations of workers has forced more systematic attention to educational matters. This work naturally takes on two forms, one which fits the worker better to perform his every-day job, while the other prepares him for promotion. The first is vocational training; the second, education in the broad sense.

The test of virility in an industrial or public utility organization is the extent to which efforts are made along the lines of these two kinds of training, and the success of these efforts. Fortunate are the young men or women who tie up to a concern which has the right educational ideals. If they remain in its employ they are sure of deserved promotion; if they leave after a time they are better prepared for any appropriate line of activity elsewhere.

Permit Yourself to Develop

Warring about the life of the great and revered Abraham Lincoln, John Hay said of him: "Lincoln permitted himself to develop."

That thought is one that every ambitious employee may well ponder and take unto himself. What Mr. Hay meant was that Lincoln kept an open mind. He sought the good in every new proposal that came to him. He was ready to listen to new ideas, to the views of others, and then build his knowledge upon the sound parts of these expressions. He used judgment, but he permitted himself to develop.

There is many a man, when a new proposal comes to him, who is very likely to think of all the reasons why it can't be done or shouldn't be. His attitude of mind is to develop resistance to the idea. If an order comes out from the main office he sees it as another curtailment of his personal prerogatives or as the academic notion of someone at a desk who doesn't know the real situation in the field. He is negative not positive, closed minded not receptive, to whatever newly confronts him with respect to his job.

Why not turn a new leaf and resolve to look for the good in an order, to see if a thing can be done, to aim

to find a way to do what the boss directed rather than seek a good reason why it cannot be done; to have an open, receptive, positive attitude of mind. Your development is largely dependent on how you receive information and instructions. But with it all, think.

Lincoln permitted himself to develop.

An Old Competitor May Become Again Active

RECENT discussions on the subject of competition to electric railways have been confined to the inroads in traffic made by jitneys and other automobiles, and the oldest competitor of the electric road has been forgotten. This competitor is no other than shoe leather and plans are on foot, to use an appropriate simile, to promote its sale, despite the effect on electric roads. "Walk and be healthy" is the slogan under which this campaign will be waged, if a suggestion made at the convention last month of the National Boot & Shoe Manufacturers' Association is accepted. The jitney, private auto and electric railway, in this instance, are grouped among those against whom the campaign will be directed.

There might be more danger from this competition if the shoe dealers and manufacturers had not raised the price of their products during the last five or six years far more than electric railway companies have done. With present prices of footgear, walking may be a healthful exercise, but it is also an expensive one, as well as time consuming. When shoes cost \$8 or more a pair, one has to be careful as to how he wears out the soles. That sum will pay for a good many car rides.

Modern Shop Tools Will Produce Better Work More Economically

THE principal reasons why railway executives purchase additional machine tools is either to provide for doing some work that cannot be carried out with present equipment or to reduce the costs of performing certain operations. Due to the lack of money during several years past railways have been unable to purchase the new equipment necessary for repair work. As a result most machine shops contain many antiquated, inefficient machines which are costly to operate, expensive to maintain, and turn out poor work. Most mechanical departments realize the savings that will result from new tools, and many executives are now considering the rearrangement of their shop tools and the addition of new equipment.

Machine tool manufacturers at the present time are devoting much attention to high production, single purpose machine tools of standard types. There is much to be said about the advantages of using standard equipment. If a breakdown occurs on one tool it is often desirable to transfer some fixtures to other machines. Where machines require special fixtures it will be necessary to carry an additional stock of them in excess of actual requirements. The taper of hole and threads on spindles, the form of tool holder, and the method of clamping tools are all considerations that have much to do with interchangeability. This leads to the probiem of having the new tools standard with old. If records show that present machines in use are up to the average productivity a change to another make is not desirable, but if the present output is low, increased economies from machines not standard with the old may outweigh the need for interchangeability of parts.

Now is the time to make a survey of your present shop equipment and see what changes are needed and what new machines are desirable. Make out a constructive program that can be spread over several years and it will be easier to convince the management and secure the necessary appropriation for new equipment. Railways for years past have not even spent sufficient money for new shop tools to replace those worn out, not to mention what should have been installed to keep up with advances in tool design and shop methods.

Association Rail and Joint Standards Become A.E.S.C. Standards

INDER the temporary provision by which existing standards of national industries can be approved by the American Engineering Standards Committee with a minimum of red tape, six proposals of the American Electric Railway Association have gone through with great promptness. This is partially due to the fact that the particular specifications involved affect practically none but the electric railway. Other proposals are held in abeyance because they do affect other industries and there has as yet not been time to insure unanimity regarding them. The action of the American Association in going into this matter thoroughly and promptly has caused favorable comment and it has helped the A.E.S.C. in getting its work inaugurated. The Engineering Association executive committee made a special point, in its assignments to technical committees, of urging that consideration be given to the selection of standards which are appropriate for submission to the A.E.S.C. this year. After this year, standards can be adopted only through the functioning of sectional committees, whose work will necessarily be more time-consuming.

Welding Strains Should Be Avoided

ONE of the most difficult welding problems that electric railway operators have to solve lies in the building up of axles and other large parts subjected to considerable strains. In building up axles, if the welded metal is laid on lengthwise, the top portion is heated by the action of the arc while the bottom remains cold. When the opposite side is reached the part just welded has again become comparatively cold. The metal in the axle is thus subjected to a repetition of expansions and contractions which cause cumulative strains and result in cracks.

Among the recent developments to overcome this trouble is the automatic welding machine. This applies the metal in a spiral around the axle, and results so far indicate that this method is quite satisfactory. Some shops without automatic welding machines are applying the metal by hand welding as the axle is rotated slowly. This method is certainly much to be preferred to that where the metal is laid on longitudinally.

Another method that has just been developed consists of heating the welded portion to an annealing heat and quenching it from that temperature. Water cooling keeps the rest of the shaft from material changes in its structure. The developments of these methods indicate that the seriousness of the problem is appreciated by manufacturers. Electric railways should instruct their welders in the serious results that may occur from internal welding stresses and insist on methods that will reduce the hazard.

Careful and Systematic Maintenance Is a Paying Investment

The Results Obtained from the Practice Followed by the Washington Railway & Electric Company Are Outlined and the Figures Given Answer for Themselves — Maintenance Costs Have Taken a Decided Downward Course and Troubles in Service Have Decreased

By J. S. Dean
Renewal Parts Engineer, Westinghouse Electric & Manufacturing Company
Pittsburgh, Pa.



East Capital Carhouse. One of the Eight Carhouses Operated on This Property

HE question of systematic maintenance is one of considerable interest and of extreme importance, as all railway operating men are vitally concerned in the possibilities of making a commendable showing to their management by reducing the charges against the maintenance of their equipment. superintendent of equipment of the Washington Railway & Electric Company has made a careful study of this operation and is convinced that it is a good paying investment to devote time, thought and careful study to the repair and upkeep of equipment. Some of the results obtained on this property are given in this article, for the benefit of other operators.

The Washington Railway & Electric Company, operating in Washington, D. C., has the Capital Traction Company as a competitor. The present population of Washington is 430,000 persons. The company operates 175 miles of track, 63 miles of which is underground trolley and 112 miles is overhead trolley. The total number of passengers carried during the year 1922 was 107,609,-948. The main shops of this company are located at 2411 P Street. This company also has eight carhouses and employs 143 men in the shops and 139 in the carhouses. The rolling stock operated includes seventy oneman cars, fifty-three pay-as-you-enter cars, ninety-one pay-within cars, 141 open-platform cars, seventy-one center-entrance cars and thirty-nine open-type cars, making a total of 465. In addition to the above passenger cars, there are operated about forty-eight service cars, such as sand cars, sweepers, plows, line cars, work cars, wrecking cars, etc.

All passenger cars operated by this company are

double-truck cars, of which 302 have two-motor equipments with maximum traction trucks, and 162 have quadruple equipments. Of the one-man cars sixty have been remodeled and equipped at the railway company's shops during the past two years, the other ten being new cars recently purchased. The various types of control used are K8, K27, K31-A, K40-A.R.2, K39-B, K-66-A. Seventy-five cars are equipped with line switches, or contactors, two per car.

The types of motors in use are G. E. 57, 200A, 200K, 210B, 201G and Westinghouse 101B, 306, 93A, 323A, there being a total of 1,409 motors in service. New bodies for thirty two-man cars are now on order. These are to be installed on maximum traction trucks equipped with two Westinghouse 93A motors and K-27 control and line switch.

In addition to the above equipment this company also operates nine gasoline-propelled motor buses on some of the crosstown streets, which act as feeders to the main line. These buses are maintained at the company garage, which also takes care of thirty-five motor vehicles for company use. This work is in charge of a foreman and six men and is under the supervision of the mechanical department.

Four years ago this company worked out a plan which was put into effect whereby all running repairs on these cars, except changing of pony wheels on the maximum traction trucks, are made at the main shops in a new building constructed and equipped especially for this repair work. This shop has three repair tracks with convenient connecting pits, and in addition for each track there is provided a "Columbia" motor-driven car

hoist operating on channel beams that engage under the two sides of the car body and lift it off of the trucks for access in repairing. Also for convenience in handling motors in and out of trucks there are provided two Sprague 1½-ton electric hoists mounted on swinging jibs. The running repairs of all cars from the eight carhouses are made at this central repair shop. This scheme has worked out very successfully and has the following advantages: The work is done by specialists

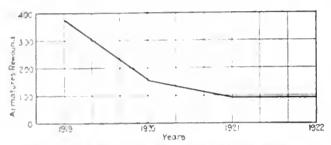


Fig. 1-Graph Showing Number of Armstures Rewnund ther a Period of Four Years

under expert supervision, which results in better repair jobs. Careful and thorough tests are made on repaired cars before they are put back into service. By centralizing all repairs the stock of repair parts is simplified. Better inspection of cars is insured at the carhouses, as the men can devote all of their time to this class of work.

This procedure has been a good investment and the new repair shop and equipment costs were but \$24,000. The shop force in charge of these repairs consists of eight men and a competent foreman. By the change made in the method of handling repair work the forces at the eight carhouses were reduced to forty-six men. In addition to the above saving of labor, the more efficient repairs on the equipment reduced the number of detentions and car pull-ins greatly, thus improving the service

All cars sent in from the various carhouses for repairs are given a complete test to insure that all of the electrical equipment is in good operating condition. When repairs are completed the car is given a service operation test by spinning the individual motors in each direction to check the motor connections to the car wiring. While these motors, from which the commutator

covers were removed, are being spun, careful observations are made of their operation to locate any defects that might show up which would develop trouble in service. High-voltage insulation breakdown tests are applied to the motors of all cars worked on in this shop, also the fields in all motors are opened up and carefully tested with a Kelvin bridge type ohmmeter.

At the various carhouses all cars are given a thorough inspection on a 1,000-mile basis to insure that they are kept in good operating condition. In addition all cars are given a general overhauling after they have made 50,000 miles. This work is done at the truck and motor overhauling shop, which is a unit of the general repair shop and is fitted with three hydraulic car hoists, which are similar in design and operation to the three electrical car hoists located in the new repair shop. To facilitate the overhauling of the motors a convenient work table 18 in. high, 4 ft. wide and 30 ft. long is provided to receive the motors to make them more accessible to the men while making the required repairs. The motors are handled to and from this table by a Sprague 11-ton electric hoist mounted so as to travel the full length of the table.

The reclamation work is done in a separate room, well lighted and equipped with two electric welding machines and manned by three men who specialize in this class of work. Electric welding is done on steel, bronze, malleable iron and cast iron and on such parts as axles, armature shafts, truck frames, bearings, journal boxes, gear cases, motor frames, grids, etc. All repaired parts go back into their stock at 50 per cent of their original money value. Actual cost figures made up on the above basis show that the saving effected by reclaiming defective material has paid for the welding equipment within a period of six months. To facilitate welding repairs on parts of equipment that cannot readily be handled, the various departments of the general repair shop are conveniently wired with plugs or jacks connected to the welding machine to which the welder can attach his welding leads and do the job at hand, thus expediting the repairs and saving the expense and inconvenience of moving heavy parts to the welding room.

To test axles for cracks and defects, the axle is thoroughly cleaned and a thin coating of whiting mixed with alcohol is applied and left to dry. The axle is then suspended and struck a few blows on the end, and





At Left—Bubbiting Boom Showing Babbiti Pots and Equipment for Thuning and Relining Branze and Malleable Iron Bearing Shells—At Hight—Babing Oven and Dipping Tank for Treating Field Colls and Campletely Wound Armatures

if any cracks are present thin dark lines of oil will ooze out, showing plainly against the white background. This method of inspection helps materially to eliminate defective axles, as approximately 100 defective ones that would soon break in service have been detected by this method of testing and have been scrapped during the past two years. All bent axles are straightened on a special hydraulic machine designed and built for this purpose. The responsibility for wheel changes is placed upon the master mechanic at the shops, who receives wax impressions of the tread and flange of the wheels sent in by the foremen from the various carhouses. These casts are made by the foremen on the wheels which, in their judgment, are nearing a condition when they should be replaced. From these wax impressions final recommendations as to replacements are made to the master mechanic, who in turn advises the respective carhouse foremen of his decision. In pressing on wheels at the shop the hydraulic wheel press is fitted with a hydraulograph, which accurately records graphically the tonnage required to press on each individual wheel. These records, as well as the wax casts, are kept on file for a definite time for future reference, as they would be of considerable value in connection with evidence required for lawsuits. After new wheels have been pressed on the axle the treads are ground to a definite size by means of a special grinding machine equipped with two high-speed carborundum wheels.

In order to reduce possible accidents due to faulty brake rods, tests on these parts are made on the cars at carhouses once each month by increasing the air pressure from 70 lb. to 120 lb., and with brakes rigidly applied, the rods are tested by rapping sharply with a 2-lb. hammer. As a result of these tests the carhouse men have broken a great many defective brake rods which would have broken in service with the possibility of an accident resulting. This test led to the development of a special machine to give all repaired and new brake rods a severe tension test equivalent to three times the pull that the rods get in service. Details of this method were published in the ELECTRIC RAILWAY JOURNAL for June 18, 1921. While under this strain the brake rod is rapped sharply by a hand hammer so as to show up any weak parts. In addition to subjecting all rods to this test the material from which these rods are made was changed from machine or soft steel to electric furnace steel, which has been found to be superior, as it is tough, ductile and readily welded.

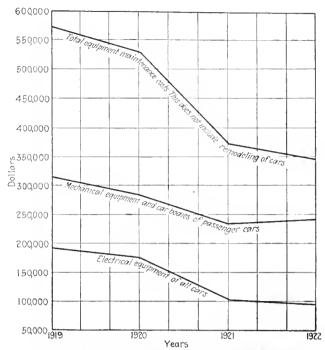


Fig. 2—Graphs Showing Trend of Maintenance Costs on Various Items of Equipment

On this property all rewound and repaired armatures are dipped and baked to protect the windings from dirt and moisture and to improve the insulation, thus increasing the life in service. The superintendent of equipment is an enthusiast on this subject and estimates that this procedure has reduced his armature repairs approximately 75 per cent. The graph in Fig. 1 shows the number of armatures rewound on this property over a period of four years and gives sufficient evidence to confirm the above statement. All repaired armatures are tested with 1,100 volts alternating current for three minutes and rewound armatures with 2,400 volts alternating current for the same length of time. Originally the armatures were tested on the above voltage momentarily, but experience has indicated that this time element should be increased in order to weed out defective windings that otherwise would have been passed as O.K. on the shorter time test.

A special testing outfit has been rigged up in the shop to calibrate circuit breakers and to give currentcollector plows an overload current test. This apparatus





At Left-The Forge Shop Is Equipped with Five Down-Draft Forges and a Large Power Hammer. At Right-A Washroom Is Fitted with Washbowls and Shower Baths for the Workmen

is conveniently located near where the plow and circuitbreaker repairs are made and consists of a switchboard fitted with the necessary switches, a circuit-breaker set for 800 amp, and an ammeter of the same capacity. Outside of the shop is located a specially designed water rheostat, which is operated and adjusted by a wheel mounted on the switchboard. The equipment used in connection with this test was described in the ELECTRIC RAILWAY JOURNAL for July 23, 1920. Experience has shown that these tests weed out defects on these parts, which reduces the number of failures in service.

Field coils are tested by means of a Kelvin bridge type ohmmeter, which enables the operator to locate any defective coils. These are then repaired or replaced ly new coils. All field coils on this property are fitted with flexible leads rather than brass terminals, as this method of making connections has been found to work out more efficiently and to give less trouble in service.



Electric Weider Repairing Side Frame of a Truck Using Current Rein) ed from the Weldlug Room

The coils after being assembled in the motor frame are given a polarity test to insure that the proper connections have been made. Very few new field coils are bought on this property, as all old and defective ones are stripped and rewound, insulated, dipped and baked and returned to service.

The Flexway woodworking machine installed in the woodworking shops is a very handy and convenient machine, with which the operator is able practically to duplicate all hand operations done by the average car-This machine not only does this work better than hand methods but is highly efficient, as it replaces the labor of three or four men working under ordinary conditions with the customary hand tools. This shop is also equipped with all the various woodworking machinery to be found in any well-equipped shop of a similar size.

The forge room of the average blacksmith shop is ordinarily considered the dirtiest and most unsanitary place in which to work on account of the smoke and dirt of the fires when in action. This problem has been successfully solved on this property by the use of downdraft forges, which, since being installed, have transformed this room so that it conforms favorably with the other shop sections and in addition has greatly improved the sanitary conditions for the workmen. This shop is equipped with five forges and a large power hammer. It was described in the ELECTRIC RAILWAY JOURNAL for Oct. 23, 1920.

In addition to the regular babbitting pots, jigs, fixtures, etc., the babbitting department has the necessary equipment to tin malleable iron bearing shells before they are relined with babbitt. This extra operation on the malleable iron bearing shells has made it possible to obtain babbitted bearings of this type in which the lining holds more securely than when depending only upon the customary anchor holes. A further improvement contemplated in connection with the babbitting work is the installation of a device for indicating the exact temperature of the metal in the babbitting pots, which will insure more dependable relined bearings.

In order to show that careful and systematic maintenance as practiced on this property does pay and is a good investment, note the general downward trend of the curves shown in Fig. 2. These three curves show the maintenance cost over a period of the past four years on this property, as follows: Upper curve, total equipment maintenance cost not including cost for remodeling cars; middle curve, mechanical equipment and car bodies of the passenger cars; lower curve, the electrical equipment of all cars. During this same period of time the maintenance cost per car-mile was reduced from \$0.045 to \$0.031, a very creditable showing.

While many improvements have been made in connection with the upkeep of the equipment and in maintenance methods, at the same time some thought has been given to the question of bettering the working conditions in and about the shop and to the improvement of the general welfare of the workmen. To this end a general campaign of safety and fire prevention has been inaugurated to protect the men and the company's property. A large washroom has been provided in the main shops, which is equipped with lockers, washbowls and shower baths and is plentifully supplied with hot water for the use of the workmen, who have shown that it is greatly appreciated.

Another very important activity to be found on this property is the holding of regular meetings to discuss the maintenance problems. These meetings, which are held periodically, are attended by all employees who are in a supervisory capacity, such as shop and carhouse foremen and assistant foremen. The following gives an outline of a recent meeting of this character held in the Potomac Electric Power Company's general office building. At this meeting the superintendent of equipment, acting as chairman, introduced the various men present, after which two charts, one showing detentions charged to the various carhouses for the past three years and the other showing rewound and repaired railway motor armatures for the past three years, were shown and discussed by the men present. The chairman then read a number of written questions from the various men pertaining to the details in connection with their daily work. Some of the subjects actively discussed by the men at this time were:

- 1. Strengthening trucks
- 2. Keeping bolts tight
- 3. Lubrication of bearings
- Bearings and bahbitting
- Brake rods
- Freezing of the air system
- Lubrication of control 8. Lubrication of engineer's
- 9. Detentions and pull-ins
- 10. Armature repairs
- Trigger lock control
- fingers Motor lead connections
- 13. Heat treated bolts
- 14. Carhouse supplies
- Motor housings
- Axle bearings Brushholders
- Fire hazards

After this discussion one reel of moving pictures entitled "Romance of Rails and Power" was shown and received with considerable interest. This was followed by an illustrated talk on maintenance of railway equipment, given by an engineer of the Westinghouse Electric & Manufacturing Company. The meeting then adjourned and every one was invited to the dining room, where a lunch, served by the company, was shared and enjoyed by everybody present.

Such meetings are very interesting and instructive and give the men a chance to get better acquainted with each other. An opportunity is afforded to present troubles and have them openly discussed and it helps the men in public speaking, as they take an active part in the discussions, and, finally, these meetings develop a spirit of co-operation within the organization which results in better team work, which is essential to the success and efficient operation of any railway property.

The Science of Babbitting Bearings

By Use of Mechanical Devices and the Exercise of Scrupulous and Continuous Care in Preparing Babbitt Metal, Highly Satisfactory Procedure for This Work Has Been Developed

HE babbitting of journal and axle bearings is one of the routine maintenance shop jobs to which master mechanics have devoted a great deal of careful attention. Each man has developed his own methods, but each is glad to learn of the plans that have been used effectively by others. One of the shops where this work has been brought to a high degree of perfection is that of the United Electric Railways, formerly the Rhode Island Company, the headquarters of which are at Providence, R. I. While the methods used there are not new, they represent the result of a gradual evolution and are well worthy of study. The babbitting work on this property, for a total of 1,200 cars more or less, is done by two men, one of whom is an expert on handling the molds, while the other devotes his attention principally to the broaching or finishing.

Contrary to the practice in some shops, the babbitt pots are heated right out on the main floor of the machine shop, where they are conveniently located with respect to a pneumatically-operated molding machine, a pneumatically-operated broaching machine and irontop benches where the molds used for lining split bearings are manipulated.

Axle bearings are babbitted in one part of the shop and journal bearings, which are babbitted by hand, in another.

For the work on axle and armature bearings, two babbitt pots are used, each containing a different composition of metal. These pots set in the top of cylindrical furnaces in which soft coal is burned.



Pair of Babbitting Metal Furnaces Used in Babbitting Axle and Motor Bearings in Shops of Providence Company

Draft for the fires is furnished by a belt-driven fan conveniently located, with suitable piping to the furnaces, and removal of the products of combustion is accomplished by the suction fans used for the downdraft forges located in another part of the shop. They are drawn into a flue pipe which passes vertically downward into the basement where the connection is made with the main suction pipe.

There are suction connections also from above the pots so as to draw off the fumes and keep down the surrounding temperature.

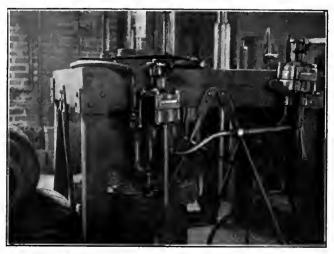
MOLDING MACHINE HAS WATER-COOLED ARBOR

The molding machine, for solid bearings, consists of an iron table through which projects a water-cooled arbor. This is raised and lowered by means of a pneumatically operated piston, working in a 16-in. cylinder and having about a 1-ft. stroke.

Water from the shop piping system circulates through the arbor, which can be easily changed to suit the different styles of bearings to be babbitted.

In operation the arbor is elevated to the proper position by manipulation of two three-way valves, the mold is placed over and around it, and the babbitt is poured and cooled all within the space of about one minute. A test made with a Westinghouse sixty-eight pinion-end bearing showed that the time required from the instant of pouring until the babbitt was hard enough to permit the bearing to be removed was twenty-five seconds.

The mold consists of a flanged cylinder, which is clamped down to the table top of the molding machine



Broaching Machine Showing Upper Part of Cylinder, Piping and Control Valve—Tool in Motion Due to Vir Leakage



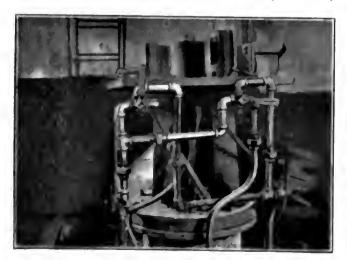
Habbitt Furnace Used in Habbitting Journal Bearings

in a position concentric with the arbor. The bearing is dropped into this mold over the arbor, its flange holding it in a concentric position resting on a shoulder inside the mold which determines the thickness of the flange. Curved iron filler pieces are then dropped into place between the mold and the bearing. A cast-iron gate, to facilitate the pouring operation, is then slipped over the top and the mold is ready for pouring.

Where it is desired to east the babbitt metal over the end of commutator-end bearings to serve as a dust cap, this can be done by having arbors for such bearings short enough to permit a ring to be placed inside the mold and over the bearing so as to flow the babbitt over the arbor about 1 in, thick.

SOME DETAILS OF THE BROACHING MACHINE

The broaching machine consists of a cast-iron table supported on an angle-iron framing with suitable bracing, below which is a 14-in, pneumatic cylinder, by



Maiding Machine with Water-tooled Air Operated Arbor

means of which a 1½-in. piston rod is raised and lowered. This is threaded on the upper end on which a tapered broaching tool is screwed. Two standard sizes of broaching tools are used, one being & in. smaller in diameter than the other.

A steel crosspiece is mounted on the table above the cylinder to serve as a stop against which the bearing is held while the broaching tool is being forced through it.

In operation the bearing is held over the broaching tool, which has been retracted to a position below the level of the table, and the air is turned on. The piston carrying the broaching tool rises, raising the bearing against the top, and the tool is forced slowly through the bearing. The air is then reversed and the tool is retracted.

This practice of broaching, which is in accordance with the recommendation of manufacturers, gives a smooth hard surface to the babbitt, increasing its resistance to wear.

For the various types of split bearings, an assortment of Weld babbitting devices are used.

What has been said in the foregoing refers to the axle and armature bearing babbitting plant. The journal bearing work is done with one furnace equipped in general like the double furnace already described but having a hood, as shown in an accompanying illustration.

The usual hand molds are used in babbitting journal bearings. In general these bearings are used as they come from the molds, but recently, at the request of the car maintainers, bearings of one type have been given two or three finishing cuts in a planer. The planer tool for this work consists of a circular cutter bolted to a shank.

Three kinds of babbitt metal are used in babbitting bearings on this property, the compositions having been worked out carefully on the basis of experience. Analyses of the metal are made occasionally to insure compliance with the specifications. The company mixes its own metal.

The composition for pinion-end armature bearings only is a tin base alloy made of eighty parts tin, five parts copper, five parts lead, and ten parts antimony. For axle and other motor bearings a lead base alloy is used, consisting of forty-four parts lead, forty-four parts tin, eleven parts antimony and one part copper. For journal bearings the composition is 96 per cent lead, 3 per cent tin and 1 per cent antimony.



Parts of Mold Used with Molding Machine

Painting Methods for Electric Railway Rolling Stock

Analysis of the Various Painting Methods Used by Electric Railways—All Companies Are Trying to Reduce the Time and Cost of Painting Cars—Use of Enamel System and of Spray Painting Are Increasing

THE two fundamental reasons for painting cars are to protect the equipment from the deteriorating effects of the elements and to effect a pleasing appearance. The latter one has a far-reaching effect in connection with passenger cars which is very often overlooked. Paint frequently forms the basis of the public's judgment as to the condition of rolling stock. Gears may be noiseless, flat wheels unknown, and detentions may be few, but if the cars need a coat of paint the property looks neglected and the traveling public forms its opinions accordingly.

Electric railways should consider the question of painting rolling stock not alone from the economic standpoint, but also from the standpoint of good-will and salesmanship. In reply to a question as to the advertising value of paint on rolling stock, the chief engineer of a prominent electric railway system recently remarked: "We believe that a well-painted car, kept in good condition to eliminate noise, is such a good advertisement that it increases the riding sufficiently to pay for the added expense of keeping the equipment in this good condition."

The painting methods and the problems which confront those responsible for the appearance of rolling stock are quite varied. In discussing this question with men closely connected with the work, it appeared that there is apparently a lack of information as to just what various roads are doing and the results that they are obtaining.

Electric railways are endeavoring to introduce economies in all maintenance departments, but the problems relating to economy in car painting are quite varied. The three principal systems most generally used are the flat color and varnish system, the color varnish system and the straight enamel system. The question of the relative value of these is still open to considerable discussion. Different railways have varying ideas regarding the relative value of appearance, and the amount of striping and lettering that is done on a car is a matter of personal taste. Painting problems have been increased with the use of modern thin metal sides and light pressed posts for rolling stock, and methods of painting to take care of these are quite different from those used with the old wooden equipment. It is evident that results obtained from any particular system must vary, due to climatic conditions and to the type of roadway over which the cars operate. Everyone knows that the effect of salt atmosphere, dirt from unpaved streets, and severe weather conditions will influence greatly the life obtained from painting.

In order to obtain information which would show results and methods employed, the editors of this paper sent out a questionnaire to 100 electric railways which were considered representative. Answers were received from forty. This information has been analyzed and the results of this investigation are given herewith. In addition to this, a survey of the paint requirements of electric railways was made and reports were received from eighty-three properties. This information has been supplemented by data obtained by several paint manufacturers who were good enough to submit their records for examination.

In order to get an idea as to the frequency with which it is necessary to repaint the rolling stock, the various railways were asked to state at what intervals they paint their cars. An accompanying table gives the answers received to this question. The answers are listed according to the painting system employed. From the answers received it appears that nearly 50 per cent

	Numb	er of Compa Color Varniah	Flat Color	ring——
Answers Received	Enamel System	and Finishing Varnish	and Finishing Varnish	Special Systems
One to one and one-half years	1		ż	·i
One and one-half to two years Two years Two to two and one-half years	2 3	· · · · · · · · · · · · · · · · · · ·	3	1
Three years	2	2		Ť
Six yearsSix to eight years	1	1	ä	
Eight to twelve years	• •	1		* *
Wooden cars fifteen months, steel ears eighteen months.	1		1	• • •
Varnish every sixteen to eighteen months, paint about every ten years.			1	
Revarnish and touch up every one to one and one-half years, repaint every two to three years				
Do all painting necessary every one and one-half years	1		• •	
60,000 to 100,000 miles	i			

of the railways paint their rolling stock at intervals of from two to three years, and apparently this is not influenced by the system employed.

The nature of the answers regarding intervals for painting indicates that the periods are rather indefinite and are influenced in many respects by overhauling periods necessary for other equipment. As examples of conditions which govern painting periods, the following representative answers are given:

"All of our cars are brought into the shop once each year for revarnishing. With this practice we have very few cars that are entirely repainted during the year. When the cars are brought in for revarnishing, the panels are repainted and the other painting is touched up generally, so that the period for repainting is rather indefinite."

"Cars are repainted and revarnished at the time they are in the shop for general overhauling. Revenue cars in general service come to the shop for intermediate inspection when they have made 20,000 and 40,000 miles, and at the 60,000-mile interval they are brought to the shop for general overhauling. Trains and trail cars used only in rush hours or special service are brought to the shop for inspection and overhauling on regular time interval periods, instead of on a mileage basis. The first and second eightmonth periods are those of intermediate inspection, while on the third and fourth-month periods the trains are given a general shop overhauling and revarnished or repainted as necessary."

"The routine interval is eighteen months. This period is in atep with our equipment overhaul. Repainting is sometimes necessary on account of physical damage at shorter periods. It would average about two years if based on undamaged surfaces."

"We endeavor to put our ears into the shop for a general overhauling on a 75,000-mile basis, or at an average interval of eighteen months. If the condition of the paint on the cars demands a total repainting at this time, the job is done. In other words, we endeavor at this time to put the car body in such condition that it will come back to us at the next overhauling period in a reasonably good condition."

In regard to the time that it is necessary to remove cars from service for painting, replies indicate that the average is about ten days. The average for the various painting systems is about the same. The accompanying table gives a summary of the answers received and shows a variation of from five to fifteen days. In some cases the time in the shop is governed to a large

Answers Received	Numb Enamel System	er of Compa Color Varnish and Finishing Varnish	Flat Color and Finishing	
Five to eight days		1		
Five to fourteen days	1			
See days	2			
Serea days	2	1	2	2
Flight days		1		
Nine days			ı	
Nine to eleven days			1	
Ten days	4	1	4	
Ten to twelve days	1			
Ten to fifteen days	1			
Ten to twenty-five days	I			
Eleven days			1	
Twelve days	1			1
Twelve to lourteen days		1		
Twelve to fifteen days .		1		
Fourteen days		1		
Fourteen to twenty-one days		- 1		1
55fteen days				
Varies according to condition of car		'		
	_			

extent by other work which is done on cars at the same time that the painting is being taken care of.

Some of the factors which enter into the time that is necessary to withhold cars from service for painting are indicated by the following answers:

"We require five days for painting safety cars and fourteen days for large interurban cars."

"Our cars are repainted at the same time they are overhauled, and they will average about thirty days in the shops for overhauling and repainting."

"Cars are removed from service from ten to twenty-five days, depending on the amount of work required for painting. Our first step when a car is brought in for painting is to strip it. It is then scrubbed, after which the carpenters and metal workers do the necessary work for putting it into condition for painting."

"The time varies according to the condition of the cars. The bodies are generally overhauled before painting."

"Cars are in the paint shop for an average of about eight days, and in the carpenter shop prior to going into the paint shop an average of ten days, making a total of eighteen working days or about three weeks."

"The length of time required depends on the amount of work necessary. Ordinary repainting requires seven days in the shop."

"The routine process for complete repainting requires eleven days. This includes twenty-four hours drying after the final coat."

"The painting process on our cars requires about one week's time. However, we always overhaul all the equipment and car bodies prior to painting. This usually requires three weeks before the car is painted."

"As we have a comparatively small system we employ but one painter. The time required is twelve days for one painter, but this could be materially reduced if two painters were used."

In order to obtain an idea of the general practice as to removing or not removing old paint before repainting, a question regarding this was asked. Of the forty answers received, eleven answered that they did not remove old paint and five answered that old paint was always removed. One answered, "We remove old paint if necessary." Of the other replies received seven answered that the removal of old paint depends on its condition. Six replied that old paint is removed only from cars with very rough or cracked surfaces. Three answered that old paint is removed when it is found loose or peeling off. Three answered, "We do not remove old paint when the foundation is good," and one each answered "We remove old paint about every seven years," "We remove old paint at alternate general paintings," and "We remove loose paint and burn off about every twelve to fifteen years."

It appears from the replies received that the condition of the paint and its body governs to a large extent the removal of paint before repainting. One answered: "At the present time we are changing our color from a dark green to red color for the panels and cream superstructure combination, and consequently we are removing all the old paint."

HOW OLD PAINT IS REMOVED

It appears to be pretty general practice to burn off paint from wooden cars and to use a paint remover on steel cars. In regard to a question on this subject, sixteen companies reported that they followed this practice. Ten others reported that they burned paint off, and seven replied that they used a paint remover. Other replies stated that the outside paint is burnt off and a paint remover is used on the inside, that a sand blast, together with a paint remover is used, that the wood is burned off and that the metal parts are sand blasted and that the panels are burned off and a paint remover is used on other parts.

Answers to a question regarding the work done between general paintings indicate that most railways touch up and revarnish their cars between what they consider general paintings without removing the old paint. Of the forty answers received thirty companies replied that they did touch up and varnish between general painting. Six replied that they did not. Three replies stated that their practice was to touch up and revarnish only after accidents, and one replied that their company did very little touching up.

In regard to the difference in painting practice with steel and wooden cars, replies indicated that on the majority of roads, the only difference is in the priming coat. Thirty-eight companies which had both wooden and steel cars reported on this. Twenty-eight replied that the priming coat constituted the only difference and ten replied that they used practically the same process for both steel and wooden cars.

An attempt was made to obtain information as to the extent that spray painting was being used and the various parts that were being painted by the spray system. Replies indicated that two-thirds of the railways were not employing the spray painting system. Of the remaining one-third that were using it seven companies replied that they were spraying the trucks and underbodies of cars. Two replied that they sprayed trucks only, two that they sprayed platforms, hoods and trucks, two more that they sprayed box and flat cars, and an additional two that they were spraying trucks and work cars. Of the remaining replies indicating the extent to which the spray process was used, one company reported using the spray method for the entire outside of the car. Another stated that of the seven

coats which were applied on the car, five of them were applied by the spray method and in addition the roof, truck, pilot, steps and bumpers were painted by the spray method.

A personal investigation at the shops of some of the companies which are employing the spray method quite

extensively indicates that the economies resulting from the use of this system are quite pronounced, and that manufacturers are co-operating toward supplying paints and varnishes which can be used and applied readily by the spray method. Spray painting is particularly adapted for work in restricted places and is economical

Criticisms and Commendations of Various Painting Systems

From Railways Using the Flat Color and Finishing Varnish System

"We prefer the flat color and finishing varnish, as the varnish has less of a tendency to crack than when the color We are revarnish system is used. quired to bring the cars in for revarnishing once each year, and if enamel finish were used it would be necessary to varnish the enameled cars at the end of the year's run, as the enamel would have lost its luster in that time.'

"We believe the flat color and varnish system to be the best. Otherwise we would change. I am under the impression that all other companies are of the same opinion that the method they use is the best. We have not been successful with the enamel system."

"We find the flat color and varnish system superior to enamel for the fol-lowing reasons: We wash our cars so often that the rubbing would wear off the stripes, numbers and letters without varnish on top of the coats to pre-serve them."

"We prefer the flat color and var-nish system because of lower cost and better appearance since cars are thoroughly finished and primed. The time required for painting is also much less. Regarding the other methods referred to, we have not tried them. enamel system seems to be worth further consideration, as it retains its luster longer than varnish, but it is not as good when first applied. We are following the records of a few cars which have been done experimentally with enamel."

"We find the flat color and varnish system requires the least possible number of coats and gives the maximum possible wear. We prefer it to all other systems on account of its economy."

"We believe that the high grade of coach finish that can only be obtained with the flat color and varnish system is unnecessary for electric cars, and we are now contemplating a change. Greater durability of the enamel system appears to make it preferable to the color varnish method, although the latter is somewhat cheaper.'

From Railways Using the Color Varnish and Finishing Varnish System

"We find the color varnish system satisfactory in that it produces a good finish, the various coats dry fairly fast and in general they do not crack, blister or peel to any extent, thus eliminating the necessity of removing old paint upon next repainting period. The objection to using a system in which a quick-drying varnish is used is that the resulting coat will crack after a short lapse of time, while if a slow-drying varnish is used, the cars are removed From Railways Using the Enamel from service for too long a period for repainting. Similarly, the objections to a system giving an enamel finish are that good enamel dries too slowly and often one coating does not give a satisfactory finish. Where two coats are necessary, this doubles the time and cost."

"We use one coat of color varnish and two coats of finishing varnish because it has been giving the best results. We do not use rough stuff as we get a good enough finish and save the cost. We have been try ng enamel for some time, but until lately we were unable to get a dark red color which would hold up and have any gloss, but the material used in the last six months has been greatly improved so as to overcome this difficulty, and we have quite a number of cars finished in enamel.

"We have obtained the best results with the color varnish system for the past twelve years. Our method carries more varnish and decreases the time that cars are kept in the paint shop. Most enamel checks and decorations do not stand up."

"Flat colors sometimes change in shade due to the chemical combination when a coat of varnish is applied on top of the flat color. This usually occurs when the car has been in service from eight to ten months. We consider the color varnish system to be the best, as we find the coats stand up longer and give better luster. Enamels do not retain the luster that good wearing body varnishes do, and cars which have been enameled do not clean up as readily as do varnished cars. The enamel is not good in appearance after two years of wear."

"We get better results at less cost from the color varnish system than we did with other systems. The flat color did with other systems. system costs more and takes more varnish and flat color. This also fades more than the color varnish. We have never used the enamel system, but observations of other companies using this indicates that it never gives the results claimed for it."

"We prefer the color varnish system as we can work two coats of color in a day, and this cannot be done with enamel finish."

"We use a combination of the flat lor and color varnish system. The color and color varnish system. enamel finish does not make as good a looking job as the varnish finish, does not last any longer and is harder to clean."

"Our standard practice is to use color varnish and one coat of finishing varnish. We have found this amount of covering material to be sufficient to protect the wood in a satisfactory man-ner for a period of thirty months."

System

"We find the enamel finish saves time, stock and labor. The durability is greater with the best grade of enamel."

"Cars are not out of service with the namel system as long, and they do not look as shabby after two and one-half

"We use the enamel system because of its lower expense, longer durability and because it can be finished more

"We have found that cars done in enamel will look better for a longer period of time than the lead and oil jobs. It is also much quicker."

"We believe the enamel system to be durable and cars finished with it look good, so we have eliminated the building up of a fine surface with rough stuff just for looks. Our system will wear as long as a finer surfaced job."

"We find the flat color and finishing varnish system slower and more costly than the enamel system. It does not look good. The same objections apply to the color varnish and finishing varnish system. The enamel method is cheaper, requires less time, gives a better finish and lasts longer than the other methods."

"We find that the enamel system wears equally as well as the flat color and varnish system and cuts our shopping period about one-half. In other words, under the flat color and varnish system it requires approximately fifteen days before the car is ready for Under the enamel system it service. requires only seven days, and the operation is considerably cheaper. enamel wears as well as the color varnish and the finishing varnish system and is about one-third quicker through the shop, although the color varnish and finishing varnish system is prefer-able to the flat color and finish varnish system."

"Experience has shown us that the enamel job looks better at the end of two years than a flat color and varnish job at the end of one year in this climate."

"After trying out three varnish and five enamel systems over a period of three years, we found one particular type of enamel system to be far superior in point of durability. ally the enamels, and particularly the one we use, do not check and crack as do the varnish jobs. Varnish will check and crack. It also loses its luster at the end of about eighteen months, whereas the enamel we now use has withstood service for over five years without showing any indication of cracking."

in the quantity of material needed. The greatest objection appears to come from the lack of interest shown by practical painters. Most of those from the old-time school follow the trade because of the pleasure derived from the wielding of the brush and the spreading of the film of color. The objections from these men are invariably that they like to have their paint brushed in. Several painter labor organizations are arguing against the use of paint-spraying equipment as being detrimental to health. The root of the matter seems to rest in a fear that the use of labor-saving methods will reduce the demand for painters.

PAINTING SYSTEM USED

Outside of the special systems, which are used by some electric railways, the various painting systems can be classified in general into three classes. These are the flat color and finishing varnish system, the color varnish and finishing varnish system, and the enamel system.

After removing the paint or where this is not entirely removed, after the loose paint and that which shows signs of cracking has been removed, those using the flat color and finishing varnish system apply a priming This is followed by a glazing or knifing coat when holes and nailheads are puttied and spotted. In general this is next followed by two rough coats or surface coats. The number, however, varies with different properties; some apply but one coat and others three. Next follow two or three color coats, and after the lettering and striping usually two coats of finishing varnish is applied. Some roads, however, use only one coat of finishing varnish. Of course, variations from this will be found on nearly every system, as frequently when cars are in fairly good condition some of the various coats may not be necessary.

Where the color varnish and finishing varnish system is used, the color varnish coats replace the flat color coats. Some roads use but one coat of color varnish; others two, and some use a combination, applying first a flat color coat followed by a color varnish coat. After the striping and lettering, the cars are finished by the application of either one or two finishing varnish coats.

Where the enamel system is used, the enamel coats replace the flat color or colored varnish coat. From the information received it appears that the most general practice is to apply two enamel coats. Some roads add a coat of finishing varnish over the enamel, and in the replies received two roads reported the use of a clear enamel coat over the colored enamel coat. large number of railways do not use finishing varnish with the enamel system. Of course there are various combinations of these systems, as some roads use a flat body coat before applying the enamel coat, and other combinations are also possible depending upon conditions. Of the forty replies received in answer to the questionnaire, fourteen railways reported as using the enamel system, thirteen used the colored varnish and finishing varnish system, seven used the flat color and finishing varnish system, two reported using both the flat color and finishing varnish and the enamel systems, and four reported the use of special The special systems reported include the Flood & Conklin's Simplex system, Murphy's A B C system, the Krakno system, and the Filkote system.

In order to obtain the opinions of a large number of users as to relative values of the various systems, the different railway companies were asked why they preferred the particular system that they are now using, and what objections they had to other systems. Some of the replies received are given on page 325. These are arranged to show the present systems which the companies are now using.

PRESERVATION IS NOT THE ONLY REASON FOR USING PAINT

As cars constitute the point of contact between the traveling public and the railway company, it is most essential that the general appearance of the interior and exterior be kept in a condition pleasing to the eye. The use of paint to improve the appearance of rolling stock is then a most important consideration. One of the best mediums for selling transportation is to adopt bright, pleasing colors.

Another reason for using brightly-colored cars is that of safety, and many companies are adopting a combination of colors to give the cars the greatest possible visibility. In order to give the service demanded by the public, high scheduled speeds are quite essential. In order to operate cars at hight speed and at the same time to promote the safety of the public, it is desirable that an approaching car should be distinguished as far as the eye can see.

Other reasons for keeping rolling stock properly painted are for sanitary effect and to improve lighting conditions. In order to ascertain how far paints are used by electric railways for these two purposes, companies were asked specifically if they used paint to improve lighting conditions and for sanitary reasons. Eighty-three companies replied to this question and 51 or 61 per cent said that they were important considerations in their use of paint.

An attempt was also made to find out how companies buy their paint. The majority of electric railways choose their paint by the manufacturer's make rather than from their own specifications. Sixty-five out of a total of seventy companies furnishing information on this point, or 93 per cent, buy all or some of their paint by specifying the manufacturer. Only five companies said that they write their own specifications.

Some of the reasons given for the use of ready-mixed paint are:

"Manufacturers know more about paint than we do."

"We cannot compete with manufacturers."

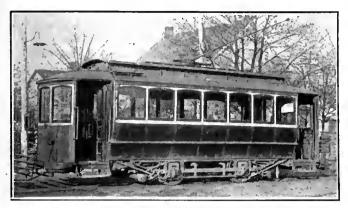
"We find that manufacturers' mixture is most reliable and economical."

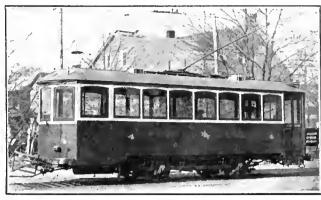
"We consider manufacturers' paint more uniformly mixed than otherwise."

"We have not the proper equipment for mixing paint."

Twenty companies who buy part of their paint readymade and mix part on the job reported using an increased amount of ready-mixed paint due to the convenience, economy and uniformity of colors afforded by manufacturers' products.

In considering some of the outstanding points resulting from the information received from electric railways, it appears that serviceability is the chief consideration in deciding upon the system or paint to be used. Operators judge results by the appearance of their cars when they come in for repainting after from two to three years of service rather than by their appearance after being repainted. Under present conditions railways cannot afford to spend money lavishly, and with the present labor and material conditions it is a self-evident fact that satisfactory paint cannot be purchased today at a less or even the same cost as three or four years ago.





North Branch Transit Car Before and After Reconstruction

North Branch Transit Company Rebuilds Cars

Ten Cars Are Being Reconstructed for One-Man Operation—Trucks Are Rebuilt, Wheelbase Lengthened, and the Car Bodies Are Provided with Arch Roofs and Are Otherwise Rebuilt on Modern Lines

HE rebuilding of cars by small railways with few wood-working machines or machine tools often presents guite a problem, and many such roads lack the courage to undertake it. Branch Transit Company, Bloomsburg, Pa., however, is not one of these, for work has been started to rebuild ten of the company's old cars for one-man operation. Accompanying illustrations show details of the first car completed. The work of reconstruction was carried out under the direction of Douglass Ford, superintendent, and Norman Fry, master mechanic, and each of the nine men who constitute the shop force had something to do with the reconstruction.

The cars being rebuilt were some purchased from the J. G. Brill Company twenty-one years ago, and the exterior and interior views show the condition of the first of these cars before remodeling. original state the cars had semi-inclosed platforms with permanent steps, a car body with bulkheads and two sliding doors, longitudinal seats throughout and a monitor type roof. In the reconstruction the bulkheads were removed so that the platform could be made a part of the interior car body. Folding doors and steps

were added. The seating was changed to cross-seats and the roof construction was remodeled to provide for arch roof construction.

In the illustration showing the framework of the car body during the process of reconstruction it will be seen that the car originally had 8-in. concave sides below the belt rail. In the reconstruction the cars were made straight by the use of 5-in. I-beams cut in seven pieces. The side posts were sawed and the straight pieces were spliced to it and bolted to the old side sills. In the new construction No. 14

gage steel was used for sides. In the reconstruction of the roof the old monitor deck was removed, but all sheathing and the rafters were used by raising them $2\frac{1}{2}$ in. in the center and sloping to the original roof position at the sides. The same size and number of windows were retained in the car body, but an additional window was added at the closed side of the end.

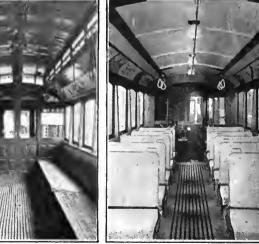
The trucks were Brill type 21-E. These were reconstructed and the wheelbase, originally 7 ft. 6 in., was lengthened to 9 ft. This was done by sawing the side frames apart in the center and lengthening these out by the use of four pieces of \(\frac{3}{4}\)-in. x 4-in. x 4-ft. 2-in. iron. These pieces were bolted on each side with 7-in. bolts, which were installed with a driving fit. The two sides were tied together by two angle-iron braces 1 in. x $1\frac{1}{2}$ in. x $\frac{1}{2}$ in. Corner plates were used to make the connections between these cross-angles and the side frames. These braces were of angle iron ½ in. x 6 in. x 6 in. This provided a very strong construction and will prevent the side frames from kicking out.

In order to prevent the teetering and side swaying which is so common with single-truck cars, four shock absorbers were installed. An accompanying illustra-

tion shows the construction of one of these. They were made by using some trolley base springs. Two irons with hooks at the end were run through the center of the springs so that the pulling caused a compression of the spring. These shock absorbers were connected between the end crossbar of the truck and the end of the car body at an angle of about 45 deg. Two of these springs were used on each end of the car.

The manually operated doors and steps were furnished by the National Safety Car & Equipment

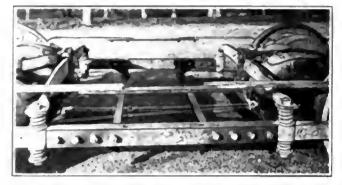




The Interior Seating Arrangement Was Changed from Loughtudinal to Cross-Seats



The Type of Shock Absorber Csed



Construction View Showing How Truck Was Lengthened

Company. As the doors open six lamps, three on either end, are lighted. These are installed over each set of doors, and the opening of the doors throws a drum switch which is fastened to the end of the door shaft and makes the necessary connections for lighting the lamps, which remain lighted as long as the doors are open. A switch in this circuit provides for cutting out the lights during daylight hours.

The interior of the arch roof was painted with white enamel, and four Electric Service Supplies Company's safety fixtures were installed for lighting. These are arranged in a single row down the center of the car. Four Garland ventilators were used which were furnished by the National Railway Appliance Company. Other fixtures installed included a Faraday signal system with push buttons on each vertical side post and also at the right side of the bulkhead posts. Sanitary hand straps and a motorman's seat were also added.

The new cross-seats installed were manufactured in the shops of the railway, the castings being made in a local foundry. Rattan cushions and backs are used and corner grip handles are provided. The Cooper hot water heater which formed the original heating equipment was retained, but this was supplemented by four electric heaters which will be used in the full and spring when continuous coal fires are not required.

Alr-brake equipment was added which consists of a



Car Body Framework in Conrae of Reconstruction

Westinghouse D.H. 10 compressor, with the necessary governor and motorman's valve. Two 6-in, brake cylinders are used, one for each side of the truck. The new seating capacity is thirty-three, which is provided by ten cross-seats, four longitudinal seats, and one seat on the platform.

All other equipment used on the car was completely overhauled. The old Union standard No. 1 trolley base was rebuilt and roller bearings provided.

Changing from 25 to 60 Cycles

undiana Service Corporation Replaces Old Converters with Modern 60-Cycle Machines, but Reconnects Old Transformers for Use on New Frequency

THE Indiana Service Corporation, Fort Wayne, Ind., recently tackled the problem of changing over its converting equipment from 25 to 60 cycles in accordance with the present tendency in power distribution for electric railways as well as general service. Some 60-cycle service had been furnished by the company, but most of the railway distribution had been at the lower frequency.

The company has ten substations, which are now in process of conversion, and one new substation is under construction. There are fourteen of the 25-cycle rotary converters with a combined capacity of 4,650 kw., which are being replaced with G. E. 500-kw., 60-cycle, sixphase machines.

In order to save expense, the company desired to utilize the old transformers, if possible, with the new rotaries. They were of sizes suitable for use with three-phase rotaries of from 200 to 450-kw. capacity, stepping down the voltage from 33,000 to 370. The new rotaries require about 445 volts from the transformer secondaries, being six-phase machines.

The manufacturers did not recommend this procedure, but after some experimental work had been done on the transformers by the Service Corporation it was decided that they could be made to serve for the present. In the shell-type transformers one of the middle primary coils was cut out of circuit and left dead. This gave the proper ratio, maintained the balance of stresses due to magnetic forces and left the transformers with the four $2\frac{1}{2}$ per cent voltage regulation taps intact.

The core-type transformers were dismantled and equal amounts of the primary winding were removed from the core legs. Wood spacing blocks were inserted to replace the removed windings.

As for the reactances of the remodeled transformers, these were found to be about right for the new rotary converters, whether the reactance was all in the transformer or part in external coils.

While, of course, the transformer windings are being operated at a voltage per turn higher than that for which they were designed no bad effects have been discovered so far.

Obviously the old transformers do not match the rotaries in regard to capacity, but this fact was disregarded because each substation has ample transformer capacity to handle present loads. As new transformer equipment proves to be necessary this will be purchased in capacity suitable for the rotaries and of standard size. The fact is that the discrepancy in capacity between the old transformers and the new rotaries is less than

might be supposed because the old transformers were designed on a liberal basis of rating, while the new rotaries are rated according to present standards.

In the making of the changeover from one frequency to the other a 500-kw. portable substation is employed to carry the substation load temporarily while the rotary and its control panel, which is purchased as part of the new equipment, are installed ready to cut into service. Interconnection with other companies already furnishing 60-cycle service is utilized also if necessary and available.

In the studies made preliminary to the work now under way the practicability of using frequency changers was investigated. The cost of this plan would have been about the same as the one adopted, but there would have been loss in conversion efficiency and expensive changes later as the old 25-cycle equipment reached the end of its useful life.

Method and Cost of Reclaiming Seattle **Paved Track**

A Detailed Account Is Given of the Organization Used, Which Was Designed to Foster Competition but Insure Good Work-Reclamation Work Was Done Under Traffic by Shimming Solid Against Old Foundation

By A. E. Pierce
Superintendent of Railway-Maintenance, City of Seattle, Wash.



Track and Paving Were Badly In Need of Repair



Sarface Appearance of Rehabilitated Track

NHE way and structures department of the Seattle Municipal Street Railway was confronted with rehabilitating approximately 2½ miles of paved teerail track in the spring of 1922. This was in different sections of the city, the separate jobs varying in length from a half to one mile. The track was breaking down at the joints, rail working badly on the ties, pavement along the rail loose and the general condition a source of continual complaint from property owners and tenants.

A closer examination showed that the track gage had become wide; that the majority of the ties were solid in the concrete base but the rail had cut into the ties and concrete; that the joint plates were badly pounded and cupped and the rail at the joints in a majority of cases split back under the head or through the web at

the bolt holes, necessitating the removal of about 3 ft. of bad rail at each joint, or the installation of a total of 12 per cent new rail in making repairs.

A number of different methods were considered for overcoming these conditions and it was finally decided to remove all brick paving liners along the rail, cut the rail back at the joints, install sufficient new rail to make up for ends cut off, shim and surface-weld the joints and repave.

The organization for handling this work was next considered and it was decided to divide the separate jobs into three divisions, with a foreman responsible for a certain portion of the work. These divisions were segregated as follows: First, a crew which removed the pavement and concrete to the top of the ties, cut off broken rail ends and moved back the rail. Second, a

crew (which proved to be the most important) for aligning the track, gaging and shimming. Third, a crew which installed concrete and paving, preceded by the welder crew, which surface-welded and ground all joints.

The work was all handled (first on our outbound and later our inbound track) in stretches of approximately four blocks at a time, the first crew continually opening more track and the third crew closing up. This scheme caused the minimum of interference to traffic and inconvenience to stores along one of the most heavily traveled thoroughfares in the city.

The type of construction on this street was as follows: The tracks were laid on 10-ft. centers with 80-lb. A.S.C.E. Lorain Section 353, 7-in. tee-rail with an average of 1 in. of ball, set on fir ties, spaced on 11-ft. centers on an 8-in. concrete base with a sub-base of clay and gravel fill.

OLD JOINT PLATES RECLAIMED

In cutting back the rail at the joints there was necessarily an increase in the number of plates and the old ones had to be rebuilt or new ones substituted. This

- 2. Two men each rail piling and sorting brick.
- 3. Twelve gangs of three men each gadding concrete, one man holding gad and two striking with hammers.

This crew cut out all battered and broken ends of rail and moved the rail back, placing a new or first class relay rail at the end of each block or whenever the waste rail equaled a standard stock length. These men gaged and spiked this rail only temporarily as they went along. This crew was also used with the work train after service to clean up dirt and refuse behind the paving crew when the paving had set sufficiently to allow automobile traffic on it.

Shimming Crew-twenty-eight men:

- 1. Two men aligning each rail, pulling old spikes, plugging old spike holes and sorting and distributing shims.
- 2. Four men each rail adzing ties to a level surface under base of rail and on either side of base for approximately 6 in.
- 3. Eight men each rail placing and wedging in shims to a solid and even bearing between base of rail and tie.







Oak Shims in Weak Cement Bearing Between Ties Where Ties Were Loose

tron Shims Were Driven in on Top of the Oak After the Latter Had Set

Manner of Tamping Concrete to Get Beacing Under Rail

was taken care of by supplying a small number of new plates. As fast as the old plates were removed from the track they were sent to our shop, built up with an electric welder and then machined to a true surface for bearing under the ball of the rail. This work was done at a cost of approximately 80 cents per pair and the results have proved very satisfactory. It was also found in surface-welding at the joints that the grinder did not leave the joints so that they conformed to the original contour of the rail. A pound developed, occasioned by the flanges striking the small bead along the gage side. This was immediately taken care of with a small hand grinder, which is considered very essential for obtaining the best results.

Employing foremen at \$145 per month and laborers at \$4.50 and \$4.75 per day of eight hours, and following the above method and organization, the following is a more detailed description, with pictures and cost data, of the separate units performing the work on Westlake Avenue from Pine to Mercer Streets, a total of 4.705 ft. of double track. The work was done under traffic with an average beadway of two and one-half minutes:

Excavating (Cutting Back) Crew—forty-four men:

1. Two men each rail picking and gadding out brick.

The shimmers under (3) worked in pairs and were organized as follows:

Head line side crew, taking every fourth tie and shimming and spiking rail on this tie to a true line and surface, using centers and grades set for this work by an engineering crew.

Second line side crew, taking the middle one of the remaining ties and shimming and spiking this to even surface and true line.

Third line side crew, shimming and spiking one of the remaining ties soundly and straight down.

Fourth line side crew, shimming and spiking the only remaining unshimmed tie in this group and following the crews previously mentioned but not passing around any of the head crews.

This method insures specializing by each crew. The foreman is always able to place his finger on the crew doing inefficient work, thereby stimulating rivalry.

On the gage side there are also crews numbered head, two, three and four, which work at all times directly opposite crews of like number on the line side. These crews or gangs place their shims and spikes evenly, solidly, carefully and permanently with crews numbered head and two, each using standard track

gages and levels. Crews numbered three and four use their eyes to surface and align on their ties.

This work was done under traffic and the foreman watched at all times for any deflection caused by cars passing. As soon as the above work was satisfactorily completed a welder crew installed welds and surface-ground at all joints.

Paving Crew-twenty-two men:

1. Eight men cleaning out all dirt and refuse and trimming the asphalt to a true line. They mixed the concrete, which was installed with the use of a templet to within 1 in. below the brick paving level, allowing for a sand and cement cushion. This concrete was tamped firmly under the base of the rail and between shims, using tamping bars, one man working from either side of the rail and opposite each other.

2. Two men mixing cushion and installing, making use of a templet to even the surface to the proper level for the paying brick.

3. Ten men laying brick, a sufficient number of brick having been salvaged from the removal to do the paving on the outside of the rail. A new bull nose brick was installed on the gage side. This bull nose was separated from the rail by second-hand liner brick laid parallel to the rail and acting as a spacer for the bull nose brick and providing flangeway for the wheels. All paving was kept 1 in. below the ball of the rail to allow for wear.

In bringing the rail up to its proper grade on the

COST OF RECONSTRUCTION WORK	
Excavating Removal of brick \$1,247.18 Removal of concrete above ties 5,887.56 Removal of concrete below top of ties 3,569.69 Trimming asphalt 1.194.56 Hauling away refuse 1,252.45 Cutting ralls 592.74 Pulling back ralls 2.051.15 Changing plates 771.28 Bolting plates 414.18	
Total Shimming Welding and grinding 299 joints. Paving	\$16,980.79 9,511.22 1,307.20 9,309.58
Grand total	\$37,108.79

adzed face of the ties all shims \(\frac{3}{4} \) in. or over in thickness were of oak, while for less than \(\frac{3}{4} \) in. iron shims were used. The oak shims varied by quarter inches from \(\frac{3}{4} \) in. to \(3 \) in. in thickness and were drilled on four corners to allow a \(\frac{3}{6} \)-in. spike to fit in without breaking the shim and allowing the spikes to come up flush with the base of the rail. In all cases the oak ties were separated from the base of the rail by a thin iron shim driven in diagonally and held in place by spikes. In cutting off broken rails the ball and web were cut by hack saw and the base burned with an acetylene torch and all holes for plates drilled by machine or hand.

The ties in places were found to be loose in the concrete base, in which case a special method of shimming was followed. An oak shim was placed on the concrete between ties and allowed to set in a weak sand and cement mixture, with a slight clearance between the top of the shim and the base of the rail. As soon as this shim bearing had set an iron shim was driven in on top of the oak. This should prevent any deflection in the rail which would otherwise be caused by the ties working in the concrete base.

The method of placing concrete under the rail and between the shims, as described under paving crew, is shown in an accompanying photograph which illustrates the operation with but one tamping bar, another being used in the same manner from the opposite side simultaneously.

The figure given in the tube covers completely overhauling and repaying of 4,705 feet of double track, or at the rate of \$7.88 per lineal foot.

This track has been under service for six months and a recent investigation shows it to be in splendid condition and good for six or eight years more traffic with very little maintenance.

The main cost of doing this work was in labor, as but a very small amount of material, such as shims, bolts, spikes, cement, sand and gravel, was used.

How the Holyoke Street Railway Organizes for Snow Fighting

THE snowfall during the past winter has been very heavy in the New England district. Recently the Mayor of Holyoke, Mass., publicly commended the Holyoke Street Railway on its success in keeping the railway lines clear during the unprecedented bad winter. The organization and methods used by this electric railway will be of interest.

For convenience in operating snow equipment during storms, the system is divided into four parts and a man is assigned to have charge of each section and is held responsible for keeping the particular lines in that section clear. The company operates eight snowplows, five sweepers, one rotary snowplow and a freight car which is used as a pusher when necessary. This equipment is definitely assigned to the various divisions except the rotary snowplow, which is held in reserve at the carhouse subject to call from any section.

At the beginning of the season, the office of the superintendent of transportation makes a list of men who are willing to serve on snow duty and assigns a certain number of these to each section. In case of a snowstorm, these men report immediately for snow duty and follow the instructions of the men in charge of that section. Snow duty is given preference over any other work. In addition to this listing and assigning of men the superintendent keeps informed in regard to weather reports and watches the barometer for any indication of a coming storm. He also provides relief crews for the men on snow duty, and refreshments as required.

All crews subject to call for snow duty are instructed regarding the equipment they use and the work that they are expected to do, so as to be fully prepared for any emergency. At the beginning of a storm and as soon as conditions demand, snow sweepers are sent out. These are followed by snowplows, whenever the snow becomes too heavy for the sweepers. In some cases where the snowfall is particularly heavy, the snowplows precede the sweepers.

During the progress of the storm, each inspector and division superintendent keeps the superintendent's office fully informed as to the condition of the line and reports immediately whenever conditions are such as to make it possible to release the snow-fighting equipment. Thus if one line is cleared ahead of another, this equipment is available for assistance on other lines. Carhouse foremen are held responsible for maintaining the snow-fighting equipment in proper condition and for supplying salt and sand as required. If any trouble or defects occur during operation, which cannot be repaired on the road, the equipment is sent to the shop immediately and is never run in snow duty with less than the full equipment of motors.

Equipment Maintenance Notes

Cutting Metals with the Electric Arc

Costs and Current Values Necessary Are Given for Cutting Various Types of Plates and Castings by Use of the Electric Arc

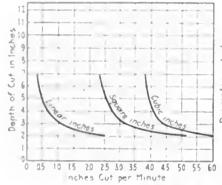
> BY A. M. CANDY General Engineering Department Westinghouse Electric & Manufacturing Company

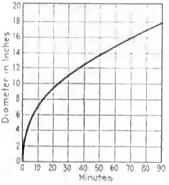
"HE process of are cutting is purely a melting process, the heat energy of the arc terminal being directed along the line where the cut is desired. Graphite or carbon electrodes are usually employed for this work, although bare metallic electrodes have been used by operating them at current values in excess of those used for welding. This latter scheme is not economical. In special

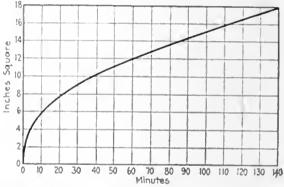
riser was then cut through the main portion, 8 in, x 8 in., in seventeen minutes, using 800 amp. With labor at 60 cents an hour and electric power at 2 cents a kilowatt-hour for the motor-generator, there would be a cost of 15 cents for cutting the neck and 52 cents for cutting the body of the riser. The speed of cutting castings of several forms is shown in the accompanying graphs.

average rate of 75 ft. per hour, an entire coal car being cut up in four hours' time into pieces sufficiently small to be handled by four men who were shearing the material for cutting into charging size. The cost of the arc cutting, including labor and power for the motor-generator, was \$6.80.

For cutting the rivets, currents of 400 or 600 amp, are usually used. When using 400 amp, average operators will cut from 1,800 to 2,000 rivets, § in. in diameter, per tenhour day, and some operators will run as high as 2,600 to 3,100 such rivets when the work is on a piece rate basis. Cutting with the arc is not limited to iron and steel, but can







M. Lett-Hate of Cutting Cast from Plates. In Center-Unite of Cutting Circular Sections of Cast from At Right-Rate of Cutting Square Block of Cast from

metallic electrodes heavily wrapped with asbestos yarn using current values higher than normal have been used for cutting, the electrodes being first dipped in water, which forms steam and blows the molten metal away. This method, however, is also very expensive and has been used only to a limited extent by the British Admiralty for cutting deep, small diameter holes in armor plate.

For general cutting work graphite or carbon electrodes are used and current values of 300 to 1,000 amp., depending upon the nature of the work and the cutting speed desired.

Foundries make use of arc-welding equipment for repairing defective castings and use the same apparatus for cutting off risers and burs from their castings. A riser from a large gray Iron castling was cut through the neck in five minutes' time using 800 amp., the neck measuring 3 in. x 9 in Just as a demonstration the value cars have been cut up at an

Where it is desirable to cut the material to accurate dimensions, it is necessary to lay out a guide line with white lumber crayon, which the operator can follow with his arc. It is then possible to make a neat cut in 1. # or } in. thick plate steel. As an example, a piece of 1-in, plate steel was cut at the rate of 75 ft. per hour using 450 amp.

Companies scrapping or rebuilding steel cars will find the arc process by far the cheapest method for cutting rivets and for cutting up steel plate material into pieces sufficiently small either to be charged directly into the cupola or to be cut up to such size that the pieces may be handled for recutting in a shear. The plate material in these cases is generally heavily covered with paint or rust so that current values of 400 to 600 amp, are frequently used and, in some instances, as much as 800 amp. Using this latter current be applied equally well to non-ferrous metals such as brass, bronze and cop-In fact, for cutting copper which cannot be cut mechanically the arc process is by far the cheapest to

Because of the high thermal capacity and high heat conductivity of copper it is necessary to concentrate the applied heat at a sufficiently high rate to melt the copper before the heat is dissipated in it. To do this cutting effectively it has been found most satisfactory to use a current value of 800 to 1,000 amp.

A large piece of copper slag which was originally 61 ft, wide and 7 ft. long along the central cut had several cuts made. The metal was approximately 14 in, thick through the sections where the side cuts were made. This was done at a rate of 31 ft. per hour. The thickness of the metal through the central cut varied from about 14 in. at the extreme edge to 7 in. at the center of the piece, the average thickness therefore being about 41 in. This cut was completed in five hours. A current value of 1.000 amp, was used for all this work. The cost of doing the work on the basis of labor at 60 cents an hour and electric power for the motor-generator at 3 cents a kilowatt-hour is \$16.78.

Reclaiming Worn Rail Joint Plates

T THE Valencia Street shops of Athe Market Street Railway, San Francisco, a crew of two to four men is kept busy continually offsetting 7 and 9-in. rail joint plates for renewal, or reworking plates that have been worn down in service. Offsetting is done to adapt plates to the connection of rails whose heads are of different thicknesses or whose webs are not in the same vertical plane, or in any of the combinations of various rail sections that require joint plates to be offset vertically or horizontally. Both offsetting and reworking usually require two heatings. The use of an oil furnace and a steam hammer greatly expedites this work, which is done by an expert blacksmith and a helper.

Worn plates are not built up by welding in new metal but by heating the plate and reshaping the same metal to the desired dimensions. The plate is taken from the furnace to the steam hammer, where the blacksmith holds it on the anvil with longhandled pincers in his left hand. With his right hand he places a long-handled shaping tool in proper position to make the blow of the steam hammer effective at the desired point. The steam hammer is operated by the helper. The tool is relocated after each blow. Work with the steam hammer is confined chiefly to the vicinity of the worn upper edge of the plate or to the longitudinal rib along the middle of the plate.

For finishing up to exact form the plate is placed on an anvil, where the helper can use a sledge on a shaping tool held by the blacksmith. On a bench beside this anvil are short pieces of rail of the section for which the plates are being reshaped, and as the final form is approached the blacksmith tries the plate in the rail section to make sure that it fits exactly.

The plates which are most extensively used on this system have a ridge running longitudinally along



t)ffset Rail Joint Plates

the center. When it is necessary to increase the height of the plate to compensate for wear the blacksmith lays it on the flat side and, with a shaping tool on the ridge, blows are struck with the sledge. Before the final fitting is finished the metal has usually cooled to such an extent that a reheat is necessary. Ordinarily worn plates are reshaped in this way in an average of thirty minutes each throughout the day.

The offsetting is done with the

steam hammer, using a die shaped to fit the particular plate section being worked.

Lubricating Trolley Wheels and Sweeper Brooms

THE Fall River division of the L Eastern Massachusetts Street Railway had some trolley wheels that were cored out hollow. This fact was taken advantage of to assist in lubrication. The hollow space was packed with waste and a hole drilled in the bushing. Then when the waste is saturated with oil the trolley wheels lubricate themselves. Wheels of this type are oiled slightly about every 500 miles and about every 1,000 miles they are dipped in oil so as to resaturate the waste. A light automobile oil is used for this purpose.

Having trouble in connection with lubrication of sweeper brooms, the railway's local master mechanic

Jinxville Railway Hits a New Pace

them to do their work better or to prepare themselves for better jobs.

Jones, the foreman of the machine shop, "although I believe that agent of some correspondence school who went through said John O'Neill, the superintendent the shops a month or two ago took of overhead, "I move you we have a several subscriptions for his courses, particularly drafting courses. As far as I know the boys are keeping up the work, next meeting. I suggest Bill Gainway, but I don't hear much about it."

"There are several of our fellows taking night courses in the Y. M. C. A.," said Tom Fairweather, the roadmaster, "and they seem to be getting a lot out of it, according to the talk I hear around the property. One or two of our boys are studying nights down at the mea year or two."

"Not so bad, after all," said the G. M., studying going on, it seems to me. Tell month. is looking after this educational work. ment, you bet. Meeting's adjourned."

WILLIAM REDFIELD, the general If it was somebody's job to take an intermanager of the Jinxville Electric est in the whole matter and head up Railway, was attending one of the eve- the ambitions and plans of our young ning gatherings of his superintendents, people we'd get somewhere. These foremen and employees. In the course fellows who are studying on the side are of the evening the question of education the 'comers'; they need to be encouraged. came up, and he asked his colleagues how Our company will get a handsome remany people on the property, men and turn on any effort put out in helping women, boys and girls, they supposed them. The company can afford to spend were doing any regular studying to fit some money, too, in this direction. We might pay part of the tuition for the courses the young people are taking. "Mighty few, I'm afraid, boss," said I'll guarantee that the directors will back me up in any reasonable expense."

> "Boss, to bring this matter to a head," small educational committee to get information together and report at our the general superintendent, for chairman. Bill's always shown an interest in the young people. The committee might find out what our people are doing now and lay plans for stimulating other young people to make plans for self-improvement."

"All in favor of John's motion say chanics' institute, too-been doing it for 'aye,' " said the G. M. "Aye!" shouted everybody with a will.

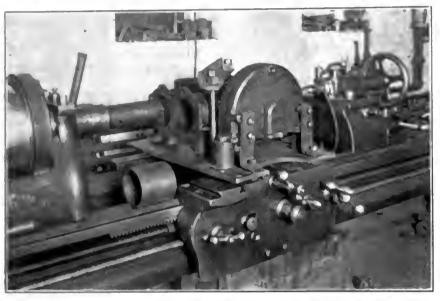
"You're on, John," said the G. M. "taking it altogether and over the "Pick two good scouts to help you and property as a whole, there's a lot of have a report here at the meeting next We'll get something worth you what, boys, the trouble is nobody while started in this educational moveequipped each oil hole with a short standpipe of 1-in, pipe, screwed into the top of the bearing and is provided with a cap. Oil squirted into this tube is sure to reach the spot and without waste.

Reboring Compressor Cylinders

THE cylinders of compressors which have been in service for a considerable time become scored and rough so that the piston rings do not fit properly. Where the compressors have to be set up in a lathe for reboring without special fixtures, much time is consumed. In order to cut down this time the Eighth Avenue Railroad, New York, N. Y., uses a special jig to hold its compressors in position, while the cylinders are

plate, so that a clamping action is obtained as the bolts in the base plate are inserted. In addition to this, an angle iron clamp extends across the top of the compressor and is bolted to the base plate by long bolts which extend on either side of the compressor frame.

In mounting the compressor and fixture in the lathe, the compound swivel is removed from the carriage and the base plate is bolted to the swiveling portion about which the "compound" rotates. By this method the compressor, together with its fixture, can be rotated so as to line up the face of the cylinders readily. The faces of the cylinders are squared up by use of a templet which is fitted to the boring bar. The position back and forth and crosswise of the lathe is regulated by shifting the carriage.



Markine and Set-1 p Used in Reboring a Compressor Cylinder

being rebored. An accompanying illustration shows a National A-3 compressor in position for reboring.

The base plate of this fixture is made of a 1-in, steel plate. There are six finished bosses on the top of this; the finished parts at the base of the compressor are set on these bosses, and thus the position in height of the center of the cylinders with reference to the boring bar is accurately established.

The compressor is fastened to the base plate by two angles on one end, a yoke on the other, and two additional angles at the back of the compressor. These are bolted to the compressor frame at points ordinarily used for the compressor suspension cradle. There is a space of approximately I in between the bottom of these angles and the base

In reboring the cylinders their diameter is increased # in. and a castiron ring is inserted, which is forced into position. The wall of this ring is & in. thick. The bore of the cylinder is made 0.004 in, smaller in diameter than that of the outside of the cast-iron ring, so that considerable pressure is required to force this in position. The reboring does not extend the entire length of the cylinder but a shoulder of 1 in. is left at the back, so that the cast-iron ring seats against the shoulder. After the rings have been forced into position, these are rebored to the correct dlameter to make an accurate fit with the piston rings.

The compressor, together with the jig, is handled into and out of the lathe by a chain hoist, and the entire operation of setting up, boring the

two cylinders, pushing the cast-iron bushings into position, and reboring them to the proper diameter requires the time of one man for about three hours.

Setting a Pole Butt Up

T SOMETIMES happens with a I railway company which uses tubular steel poles to support its overhead work that one of these poles will become broken off at the ground line. The repair gang may not be able to dig a new hole and set the shortened pole in it, and even if it should do so the repair would be but temporary as the replaced portion of the pole would be several feet shorter than the others on the line. While it is not desirable to go to the labor and expense of resetting the old broken pole in this way, yet it is desirable that some arrangement be made for supporting the span where the pole was broken off.

The easiest and quickest way of doing this is to put the old pole back just where it was in the first place, only upside down. What was formerly the upper section is stuck down into the hole, the walls of which are formed by the piece of the old pole remaining in the ground, and the largest section of the reset pole is then at the top. With the ordinary three-section tubular steel pole the internal diameter of the largest pipe -the section left in the ground-is approximately 1 in. larger in diameter than the external diameter of the smallest section, so that there is sufficient room for making the repair in this manner.

The span wire is then attached to what was formerly the butt of the pole and the temporary repairs are complete. While the job is not an ornamental one and can be considered merely as a temporary expedient, yet it is safe and can be left standing for some time if there is no opportunity to set a new pole at once.

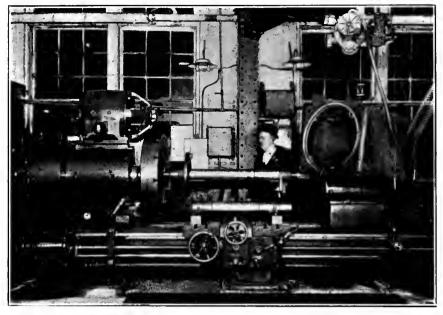
Grading Trolley Poles for Length Automatically

A CONVENIENT plan for storing trolley poles is used in at least one shop. The poles are hung from the harp end with the upper ends at a uniform height. The location of the lower end of the pole on the wall then is an exact measure of its length and a man who needs a particular length for a car can pick out the one he needs without having to stop to measure it.

Jig for Reboring Large **Motor Cases**

AMONG the equipment of the Chicago Elevated Railroads is a large number of cars equipped with G.E.-55 box frame motors, which have been in service for more than twenty years. These motors, which have cast-steel frames, were designed for inside suspension and have a channel in one side of the frame to make room for the axle. Some time ago the axle diameter was increased, which necessitated a deeper milling of the axle groove so that the frame thickness at that particular point was materially reduced. At a later time the thickness was again reduced by milling to make room for heavier axle brasses. The decreased thickness along the axle channel and the uneven thickness of the frame in various other parts allowed it to become considerably warped and out of true. The high average operating temperature, approximating closely 275 deg. F., reached during the summer months, was undoubtedly the actual cause of the distortion. The frame distortion naturally threw the end plates out of line so that considerable trouble was experienced from hot armature bearings. When it was discovered that the end plates in the box frame were not in line with the pole pieces, steps were taken immediately to find some way of lining up the bearings. The process of shimming was discarded as impractical. The only method left was to rebore the motor shells and for this work a specially constructed jig was devised. The accompanying photographs show the jig in place on the lathe and illustrate the process.

The jig consists of two bed blocks

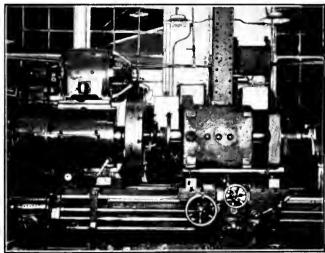


Jig Set Un for Reboring G.E.-55 Motors in the Wilson Avenue Shops of the Chicago Elevated Railroads

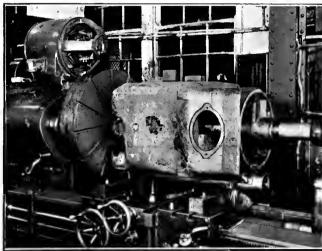
laid across the lathe carriage. These to be fitted individually. In doing two blocks are milled to receive a rod of the same diameter as the car axle. The motor housing is lined up on this rod, axle brasses having been inserted to obtain the correct distance between the axle and motor centers. Two cap screws are provided in each cross block, so that the motor frame can be centered in the lathe by rotating it slightly about the axle.

A boring bar with a tool plate on one end and a tool arm on the other comprises the remainder of the special equipment. In reboring a frame end the tool is set so that a cut is taken over the whole surface and the carriage is advanced far enough so that the tool forms a new seat for the end plate. Thus no two motor shells are bored to the same diameter so that each end plate has this the plates are reamed and mounted on an arbor. The edge is turned down to a smooth surface and a 1-in, steel strap applied around the whole circumference which is again turned down to the diameter of the shell to which it is applied.

With the equipment set-up as illustrated it is possible for a good machinist to rebore five shells in one day, or four per day if the jig must be set up and taken down besides. With machinists being paid 90 cents an hour the cost of reboring the motors alone amounts to \$1.80. Lining up the motors in this way has been very effective in eliminating bearing trouble but unfortunately there is no asurance that the housing will remain square because of the uneven expansion and contraction.







View of the Tool Arm on One End Taking a Cut

Transfer Table Controller Used for Shifting Trucks

TANY electric railways shift M their trucks about the overhauling shops by applying power to the motors mounted on them. In most cases a permanent installation is made of a controller with the necessary resistance, together with long flexible leads which can be attached to the terminals of the motor on the trucks. The New York & Harlem Railroad, New York City, makes use of the controller and resistance which is used on a transfer table for its operation. The transfer table runs along the end of the truck overhauling shop, and after cars are jacked up the trucks are moved out from underneath and to convenient tracks in the overhauling shops by shifting them to the transfer table and then off as required.

In this case the only additional equipment required is a four-pole double-throw switch, together with the necessary receptacles and long flexible leads. An accompanying illustration shows the method of connecting. The four-pole double-throw switch is installed in a cabinet alongside the transfer table controller and connections are made to the center studs of this switch from the A1. AA1, F1 and G1 terminals in the controller. The upper studs of the

out trouble, and by attaching the other end of the flexible leads to the motor terminals on the truck and by throwing the switch to the down position power can be applied to the motor mounted on the truck. This arrangement is very convenient and the transfer table is really a part of the truck overhauling shop. necessary equipment for moving the truck is provided at very small additional cost.

Flat vs. Rounded Contact Tips for Brushholders

T'HE contact tips on the pressure fingers of a great many of the older types of railway motor brushholders were made from either brass castings, copper drop forgings or extended copper bars. In general, all of these tips were very similar in design and shape, consisting of a flat back or base with a projecting rounded front or face which extends beyond the sides of the base. These tips are held to the flat braided shunt and pressure spring by means of four rivets. The flat base of these tips makes a good contact with the shunt, while the rounded face engages on top of the carbon. This type of construction has been more or less criticised by railway men, as they have always experienced con-

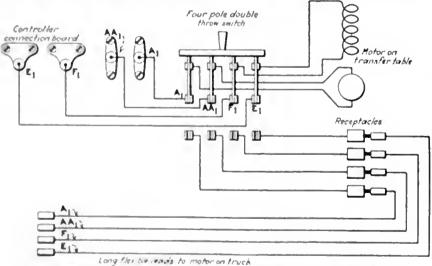


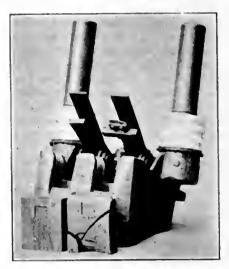
Diagram of Connections for Catag Controller on Transfer Table to Shift Trucks in Overhauling Shops

with the switch in the up position the transfer table is operated in the usual manner. The lower poles of the switch are connected to perma- ly after it has been put in service. nent receptacles, so that the male portion, which is attached to the long flexible leads, can be inserted with- tip which in some cases is brazed to

switch have leads connecting to the siderable trouble due to the rounded motor on the transfer table, so that face of the contact tip seating itself on the top of the carbon, and in many cases damaging the brush to such an extent that it must be replaced short-

To overcome this trouble, presentday practice is to use a flat copper

the shunt and pressure spring, while on other designs the tip is riveted to the shunt and spring. Both of these types of construction seem to give good results in service. In order to get some definite information as to the operation of the flat contact tip .



Brushholder with Flut Contact Tlo

as compared with the rounded tip in service a special test brushholder was made up on which one of the pressure fingers was fitted with the old type extruded metal contact tip, while the other pressure finger was fitted with a flat copper tip brazed to the shunt and pressure spring.

This brushholder, with spring pressures adjusted to approximately 6 lb. and fitted with new carbons of the same grade, was given a test in a railway motor under actual service conditions, and after about three months' service was removed for inspection. By referring to the accompanying illustration it will be noted that the old type rounded tip has worn a seat in the top of the carbon and finally broke out the sides on the top of this carbon. After this damage is done, the tendency is to rattle the carbon brush about in the box, which finally breaks it to pieces. On the other hand the carbon used with the new flat type of tip is intact and in good condition and shows no signs of breaking either on the top or in the body of the carbon. It is, however, slightly grooved on the top by the rubbing action of the flat tip on the carbon at this point. Not only does this test brushholder show that the flat type of tip is an improvement over the old rounded type tip, but the operating results of brushholders fitted with these tips confirm these test results, which indicates that this construction is a decided improvement over the old design.

Welding Old Rail by Thermit Process

WELDING old rail by means of the Thermit insert process can be carried out providing the rail is not too badly corroded and pounded at the joints. Where the rail is in good condition and only slightly pounded, the weld can be made without cutting in a new piece of rail. In such cases the receiving rail should be raised until the lower part of the cup is on a level with the running surface.

The end of the discharging rail should then be cut off about 1 in. to 3 in. to eliminate the battered end and at the same time to provide a gap for the Thermit insert. This procedure after grinding eliminates the battered joint and restores a smooth running surface. The usual method of making the weld is then followed identically with what has already been described, excepting that in some cases it is necessary to do a little hand-luting with fire clay around the edges of the mold boxes, in view of the fact that it is quite impossible to design patterns which will conform exactly to the contour of rail which is partially worn.

Transferring Trucks Across Pits

N THE Fall River division of the Eastern Massachusetts Street Railway considerable remodeling has been going on recently in the maintenance shops. A shop that was at one time a paint shop and later used for storage has been converted into an excellent pit shop with con-

The construction of the shop is



Crane Car as Reconstructed

simple and does not readily permit the installation of many of the devices familiar in large shops. Ingenuity has been brought into play in the development of simple schemes for performing routine operations. An example is the plan used for transferring trucks from pit to pit.

For this purpose a portable crossover with an auxiliary flat track is used. A hose bridge such as ordinarily used for carrying cars over fire hose was mounted on a square framework built up of T-rails and flat bar as shown in the accompanying illustrations. This rolls on double-flanged wheels carried by the hose bridge.

The transfer truck thus constructed rolls on temporary track with stout timbers across pits to support the rail. It is the work of but a few minutes to bring it into pin of the revolving base.

Crane with One Trolley Serving All Motors

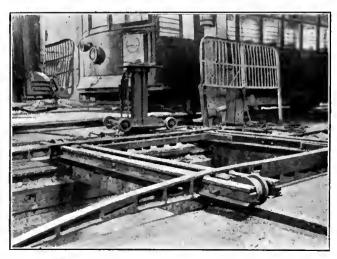
5-TON electric locomotive crane owned by the Market Street Railway, San Francisco, was recently reconstructed in such a way that instead of requiring two trolleys, as heretofore, one is used both for supplying motive power and for operating the crane motor. This was highly desirable because the trolley on top of the crane cab, which served the crane motor only, was found to interfere with or render dangerous the operation of the crane boom.

The rearrangement was made by T-rails, which project beyond the removing the crane trolley and bringing in the power supply lead from the other end of the car. This lead was fastened under the car body and passed upward into the crane cab through a hole drilled in the center

While the base was dismantled for



The Use of This Transfer Permits Trocks to Be Shifted Readily from Track to Track



A Closer View Showing Some of the Construction Details of the Transfer Truck

this rearrangement, the pedestal on which the rotating weight is carried was raised about 4 in., thus increasing by this amount the clearance between the floor of the car and the bottom of the revolving crane frame. This change made it possible to carry a supply of 9-in. girder rails 62 ft. long loaded on the car flange down, instead of flat, thus increasing the carrying capacity of the crane from two to six such rails.

The crane has been in service about seventeen years and was built by the Northern Engineering Company.

Where Cleanliness Is Next to Godliness

THE importance of keeping dirt and grit out of lubricating oils is realized by all responsible for the maintenance of electric railway rolling stock. Results have shown that a very little dirt mixed with the lubricating oil in bearings causes them to wear in a very few hours.



til Room, New York State Rallways,

Where armature bearings become worn, there is danger of very costly damage through the armature being let down sufficiently to rub the poles.

The New York State Railways realizes the Importance of keeping oil as clean as possible and it has endeavored to Impress this on its railway maintenance men. The accompanying Illustration shows one of the oil rooms at the Federal Street carhouse, Rochester, N. Y. A very conspicuous sign impresses one with the importance of keeping the oil house clean. The sign reads: "Keep this place clean. Employees who get oil, grease, etc., from this oil house must not spill oil on the floor or tanks. Don't use wool waste to wipe hands."

Estimating Ballast

THE Pacific Electric Railways has recently conducted a series of experiments to determine the quantity of rock required for hand and mechanically-tamped ballast in paved streets. The weight of 1 cu.yd. of crushed rock which had been hand tamped was found to be 1.3 tons. This figure being obtained by hand tamping a given length of track, figuring the cubical contents, and weighing the material used. This figure of 1.3 tons had been used for estimating all hand-tamped work.

When the company decided to use mechanically-tamped ballast it was necessary to re-estimate the quantity of rock needed. Theoretically, 1 cu.yd. of crushed rock ballast, with all voids removed and the proper compression obtained, should equal 1 cu.yd. of rock. Therefore, for the original estimate the weight of 1 cu.yd. of rock was used, namely 1.75 tons. Even with mechanicallytamped ballast this theoretical condition cannot be reached. However, the actual results of experiments show that 1 cu.yd. of mechanicallytamped ballast weighs 1.69 tons or 30 per cent more than the handtamped ballast.

This increase in the amount of crushed rock is a large item in the consideration of ballast, but tests have proved that mechanically-tamped ballast adds greatly to the life of the roadbed by furnishing firmer base for pavement and heavy girder rails.

Living Up to the Reputation of a Parlor City

BINGHAMTON, N. Y., has been termed the parlor city. The electric railway company there is helping to maintain this reputation by keeping its cars in an attractive condition. All cars are cleaned every night, and before they leave the carhouse in the morning they are sprayed with West's disinfectant. All windows are wiped every day. Three times a week all windows are wiped with a wet chamois inside and car renovator is used on the outside in winter. In summer the outside surfaces of the car are washed.

In addition to keeping the cars in a clean and attractive condition, the equipment is kept in a high state of ground glass "Stop" repair, and special attention is given to the use of devices which will render the cars more satisfactory to the public and promote better service.

The cars are electrically heated and the heat is automatically controlled by a thermostat. In addition particular attention is given to ventilation.

The railway company has made it a practice to advertise these features and an advertisement in the Binghamton *Press* for Feb. 13 reads in part as follows:

"The street cars of Binghamton are considered by those who have seen equipment in other cities to be the most modern and up to date as well as the cleanest. Our cars are a credit to the parlor city. We gladly welcome an inspection by the public any morning before the cars leave the carhouse."

New Equipment Available

New Crossing Signs

HIGHWAY crossings on the rightof-way of the suburban lines of the Twin City Rapid Transit Company, Minneapolis, Minn., are being marked with a new type of signal. This is an Adams & Westlake design and burns Standard Oil Company's "Fortnight," oil, which enables the lamp to burn thirty days without attention. The railway company's standard railroad crossing sign is



Hallroad Crossing Stop Sign

mounted at the top of a 10-ft, post set in concrete. Beneath is the illuminated signal, which has two lamps 24 in. apart. The light shines through red projecting lenses and also is reflected by mirrors through ground glass "Stop" signs. This signal is reinforced by two approach signs located some distance from the crossing and reading "Danger, Railroad Crossing 400 ft."

Truck-Mounted Portable Air Compressor

NEW development in portable track maintenance machinery found in an air compressor mounted on a standard Ford truck which has just been introduced by the Ingersoll-Rand Company, New York, N. Y. This complete nortable air compressor is constructed in such a way that it can be mounted on the standard Ford chassis without any alterations in the chassis. It is not even necessary to drill any bolt holes in the chassis as the compressor is firmly held down by means of "U" bolts.

The air compressing plant consists of a two-cylinder vertical compressor, direct-connected to a fourcylinder, four-cycle, tractor type of gasoline engine; a radiator and fan for cooling the water for both the compressor and engine, an air receiver, fuel tank and other accessories. A regulator is furnished for automatically throwing the load off the compressor when a predetermined maximum reservoir pressure is reached and throwing the load on the compressor at a predetermined minimum pressure.

With the outfit there are also sunplied several tool boxes which are attached to the steel frame holding the compressor and engine. These are used for holding rock drills and

utes to a day's time were often necessarily performed by hand because it was hardly a paying proposition to haul a standard portable compressor to the job.

Recent Signal Developments

URING the past year the Nachod Signal Company, Inc., has further developed its automatic headway recorder, for printing on a chart the time that cars pass a given point. so as to render it more robust and foolproof. Means have been provided now so that a winder may not overwind and break the clock spring in the movement and the design has been changed so that friction will be

Block signals have been further developed so that relays for different purposes may be assembled largely from the same elementary parts. whereby railways using several kinds need carry but relatively few different spare parts.

Highway crossing signals for single track have been installed with an overlapped clearing control, so that the bell or other warning signal is not stopped until the car going either way has passed the crossing by a short distance. Thus the bell continues to ring, even after an accident, with the car stopped near the crossing, so that better evidence



Compressor Outfit Mounted un Ford Chassis

pneumatic tools driven by the com- is afforded that the signal was given pressor. As will be seen by the illus- properly. tration the entire outfit is mounted on a steel base and covered by means signals will be made for long singleof a sheet steel canopy with remove- track blocks between passing sidings, able sheet steel doors. This com- in which the entire block is retained pressor has a capacity of 91 cu.ft. of as a unit for opposing movements, free air per minute.

tially for high-speed transportation. each of which sections but one car Small jobs requiring from ten min- of a train is permitted at a time.

Further developments of block but is subdivided into absolute sec-This outfit was developed essentions for following movements, in

Automatic Window Wiper

AFTER a test under service conditions the Grays Harbor Railway & Light Company, Aberdeen, Wash., has installed on all its cars the Polk-Hueber automatic window cleaner. This device keeps the window in front of the motorman free from rain, mist or snow. In this section of the country the rains are very severe and the average rainfall



Automatic Window Wiper on Safety Car

per year is well over 80 in. Rain. mist and snow cover up the window in front of the motorman and make it difficult for him to discern clearly objects even close to him.

The device consists of a cylinder reciprocating on a hollow "power rod," through one end of which air pressure from the air brake system is delivered to the cylinder. Small brass tubing connects the power rod to the air piping in the front of the car, where a small shut-off valve is located conveniently for the motorman. The cylinder moves back and forth across the window as long as the valve is open and the speed of the cylinder is regulated by the valve.

Attached to arms extending from the cylinder are rubber blades which are, by a simple spring arrangement, made self-aligning to the window glass with sufficient pressure to wipe the window clean of rain or snow as they travel back and forth. The blades will clean a space 15 in. wide from edge to edge of the glass, the length of travel being determined by the length of the cylinder.

The application of "suction" to the "exhaust" end of the power rod instead of air pressure to the pressure end causes the cylinder to operate the same as when air pressure is used. As only a very small amount of air pressure is required to operate the cylinder the cost of operation is

and Lantern

LECTRIC tlash lamps and lanterns have come into quite general use in electric railway shops at points where extension lights are not available, or where their use is inconvenient.

venient electric lantern, the National Marine Lamp Company, Forestville, Conn., has just brought out a name "Excellight." This light em-



New Type Electric Lantern

nience not found in previous types. Two No. 6 dry ceils are used for furnishing the current, These are mounted in an aluminum casing and the connections between the light switch and the battery terminals are made when the top section of the iantern casing is set in place on the lower section. Four spring clamps, two on each side hold the two sections of the aluminum casing together. A soft fiber gasket forms a leakproof joint.

For turning the light on and off a push button switch is provided in a convenient location, so that it can be manipulated by a finger of the hand carrying the lantern. This leaves the other hand free for carrying materials or performing other duties. Special precautions have been taken to make a unit which will withstand rough usage, and this light can be dropped or knocked against hard objects without impairing the working of the light or damaging the

tected in the aluminum casing by a to handle the load. 1-in. wire-reinforced glass.

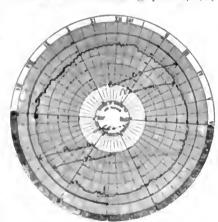
inside the top of the casing.

Metal for Welding Aluminum

THE Marshall Metal Corporation. New York, N. Y., is marketing a To supply the demands for a con- new metal welding aluminum. This has the trade name of Buildog Metal. The welding is accomplished by applying heat at and around the surfaces new type to which it has given the to be welded with an acetylene or gasoline blow torch until the Buildog bodies elements of safety, more Metal will stick to the surfaces when powerful illumination and converubbed on. The metal is then distributed by brushing firmly with a wire brush so that it will enter the pores of the aluminum. When the surfaces are well tinned, additional metal is puddled onto the surfaces, and when held firmly together while additional heat is applied a thorough fusion weld will result. After the weid has been completed and the metal is cooled, the welding metal can be chiseled, filed, ground, scraped and buffed to make a perfectly smooth surface.

New Barometer and Vacuum Recorder for Steam Turbines

HE Uehling Instrument Company, Paterson, N. J., has just placed on the market a new combined barometer and vacuum recorder primarily for determining (1) the absolute back pressure in steam turbine and condensing plants, (2)



Sample Record Chart of Barometer and Ancous

A bell-shaped reflector is provided the barometric pressure, (3) the conwith an adjustable focus which per- denser vaccum, (4) the existence of mits a spread of light to be regulated air leakage into the condenser, etc., as desired. This reflector is pro- and (5) the ability of the condenser

Pro- The combined recorder consists of vision is made for carrying two extra two float chambers, one of which is

Handy Electric Flash Lamp light bulbs by small spring clamps connected with a barometric mercury which are conveniently attached column and the other with a mercury column in communication with the condenser. These columns and float chambers are secured to the recorder case. The pens are actuated by means of floats resting on the mercury in the two chambers. The movements of the floats correspond



New Combined Barometer and Vacuum Recorder

exactly to the changes in barometric pressure and in vacuum.

The use of the mercury columns obviates the necessity for calibrating the recorder against mercury column testers.

The recorder automatically and continuously draws the barometer and vacuum records on the same chart. The barometer record is used as a base line for reading the absolute back pressure directly off the ehart. As long as the two curves, barometer and vacuum, vary simultaneously and proportionally, everything is as it should be. Should, however, the vacuum fall when the barometer remains constant, either considerable air is leaking into the condenser, or the condenser is overloaded.

The instrument records any part of the total range of 0 to 31 in. Vacuums from 25 in. to 31 in., and the corresponding absolute back pressures, or vacuums from 20 in. to 31 in., etc., may be recorded with great accuracy over nearly the full face of the chart, the rest of the chart being used for recording, on a contracted scale, the lower vacuums down to atmospheric pressure.

The accompanying chart shows a typical barometer record in the outside line, with a fluctuating vacuum line inside.

Association News & Discussions

Welded Rail Joint Work Progressing

A MEETING of the executive committee of the committee on welded rail joints, whose work is being financed by the American Electric Railway Association and administered under the auspices of the American Bureau of Welding, met in Washington, D. C., on Feb. 15. There was a full attendance.

Details of the methods to be used in the making of the tensile, bending, drop and conductivity tests were settled. The preliminary designs for the proposed repeated impact and rotary service testing machines were closely studied and the preparation of the final designs was placed in the hands of sub-committees. E. J. Mc-Ilraith is chairman of the committee on the impact machine and W. W. Wysor is chairman of the one on the rotary machine.

A meeting of the full committee was held on Feb. 16, with forty members and guests in attendance. The committee went over in detail a report from the executive committee and approved all of its recommendations.

There was then given, in the laboratories of the Bureau of Standards, where both meetings were held, a demonstration of the bending, tensile and conductivity tests which will be made later on an extended scale. The demonstration was highly satisfactory to the committee. The special grips for the tensile tests were examined, and announcement was made that the committee has ordered special auxiliary heads for the bureau's Emery testing machine. These permit a specimen to be gripped without machining.

After the demonstration the group was divided into small parties and conducted on a tour of inspection through the bureau property.

Building and Structures

THE outstanding feature of the meeting of the Engineering Association committee on buildings and structures, held recently in New York City was the planning done in regard to researches on passenger and freight terminals and arrangements for prepayment and postpayment of fares. Committees had already been appointed to handle the four topics assigned by the executive committee. The personnel of these subcommittees is as follows: Electric railway terminals for city and interurban service, C. W. Burke, Brooklyn, N. Y.; J. D. Kent, New York, N. Y.; S. J. Steiner, Aurora, Ill., and D. A. Scanlon, Akron, Ohio (representing the T. & T. Association). Waiting stations other than terminals of moderate cost for interurban lines, J. R. McKay, Fort Wayne, Ind.; B. R. Brown, Dallas, Tex.: Mr. Scanlon and

L. L. Newman, Birmingham, Ala. Design of small bridges, culverts and trestles, Mr. Steiner, J. N. Penick, Richmond, Va., and James Link, Knoxville, Tenn. Review of existing standards, etc., the whole committee.

The committee went into details of design of small bridges, culverts and trestles, as well as interurban waiting stations. Blueprints were shown of modern electric railway buildings.

The meeting was attended by N. E. Drexler, chairman, and Messrs. Burke, Kent and McKay of the committee, Mr. Scanlon for the T. & T. Association, R. C. Cram, vice-president of the association, and S. Clay Baker, East St. Louis, Ill.; J. H. Haylow and Frank Tingley, Washington, D. C., representing the committee on way matters.

Midyear Conference Gets Wide Attention

B ELIEF that the holding of the Midyear Conference in Washington would result in widespread publicity for the industry is borne out by proof now at hand. Both the Washington newspapers and those outside Washington recognized the gathering of the great national body to tell what had been done to carry out the government's suggestions for rehabilitation as one of considerable news interest and handled it accordingly.

A striking feature of the meeting was that every paper in Washington regardless of its utility policy handled the meeting on its news merits. In fact the two papers generally reputed to be "anti-utility" showed their fairness and recognition of news values by publishing the proceedings liberally.

A special news service for the benefit of all newspapers and press associations was run during the meeting by the advertising section of the Committee of One Hundred. Individual stories were prepared for the different papers and organization in accordance with the committee's policy not to deal in "canned" material.

Three speeches, those of President Emmons, Mr. Lewis and Senator Davenport, were distributed to newspapers throughout the country by mail in advance of the meeting and they were used generously.

Pictures also played an important part in the proceedings. On Thursday every newspaper in Washington carried pictures of some of the officials of the association. When the executive committee called at the White House half a dozen photographers representing national services posed the committee on the steps and took photographs of them. The Washington papers carried the pictures the following day and later they were given country-wide distribution.

J. R. McKay, Fort Wayne, Ind.; B. R. Old newspaper men in Washington Brown, Dallas, Tex.; Mr. Scanlon and were impressed by the fact that any

convention—of which there are about a dozen a week in the capital—would attract a letter from the President, and a visit from the Vice-President and the former Vice-President and a member of the cabinet in person.

The conclusion to be drawn from the entire situation is that the Association's policy of "the truth in publicity" adopted at the outset of the Federal Electric Railways Commission hearings in Washington, four years ago, was the constructive one to follow.

New Date for C.E.R.A. Summer Meeting

ON ACCOUNT of conflicting with another convention scheduled for Cedar Point, Ohio, the date of the summer meeting of the Central Electric Railway Association has been changed from June 27, 28 and 29 to a new date of July 18, 19 and 20. In some respects this date will be more desirable as the water will be somewhat warmer for bathing purposes, Cedar Point having a splendid beach. The hotel and arrangement committee, of which S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio, is chairman, is laying plans to make this meeting unusually attractive.

Six Standards Approved

THE American Electric Railway Association has received word from Dr. P. G. Agnew, secretary American Engineering Standards Committee, that the following proposed standards, after consideration by a special committee which approved their adoption, had been unanimously approved by the member bodies and may now be designated as American Standards:

A.E.R.E.A Manuai Section			.E.S.C. ignation
Wr 3c	9-in. girder grooved	i E	5-1923
Wr 4c	7-in. girder grooved	1	
Wr 5a	9-in, girder guard rail 7-in, girder guard rail	\mathbf{E}	7-1973
Wr 6a Wm 4b	Joint plates for 7-in		0-1325
	girder grooved and guard rails	. Е	2-1923
Wm 5a	Joint plates for 9-in girder grooved and		
	guard rails	\mathbf{E}	3-1923

The adoption of these specifications as American Standards is a logical step, since they have been widely accepted by the electric railway industry. The extent of their use is found in the records of one of the principal manufacturers of steel rails, which show that during the year 1922 approximately 79 per cent of its total tonnage of girder rails shipped to electric railways were A.E.R.A. standard sections. This company's records also show that during the past seven years 62 per cent of its total tonnage of electric railway girder rails were association standard sections. The increasing use of these rails by the industry and their adoption as American Standards is evidence that the work of the association in this field of standardization has been based on sound engineering principles.

The News of the Industry

Paving Assessment Upheld

United States Supreme Court Declares Legislature Has Power to Make Reasonable Classifications for Taxation

"The power of the Legislature to make reasonable classifications (for taxation) and to impose a different burden upon the several classes cannot be denied," declared the written opinion of the United States Supreme Court, rendered on Feb. 19, in affirming the decision of the North Carolina Supreme Court, which upheld an assessment for paving made by the city against the Durham Public Service Company.

The city decided to pave Main Street and made demand that the company bear the cost of paving between its double street car tracks on the street. The company refused on the ground that its contract did not contain this obligation. The city thereupon paved the entire width of the street and assessed the company \$102,942 as its share of the cost. The company brought sult to resist this assessment, alleging that its contract did not compel it to bear the cost of paving the roadbed and that the assessment was excessive, pointing out in the latter connection that owners of abutting property had been assessed a sum approximately \$13,000 less than that claimed from the Public Service Company, although the taxable valuation of this abutting property was many times greater than the value of the company's physical property on the street.

In making the assessment the city relied upon an act of the legislature delegating authority for such acts to municipalities of North Carolina. Both the State Supreme Court and the United States Supreme Court declared this legislative act valid, and the assessment by Durham under the act legal.

United States Supreme Court Denies Canal Title to State

Restoration of the title to the Columbia Canal to the State of South Carolina from the Columbia Railway, Gas & Electric Company, which uses it for hydro-electric development, was denied by the United States Supreme Court in a decision rendered Feb. 19.

Title to this canal was vested by the State in the penitentiary board in 1887, with the proviso that it be extended to Gervies Street within two years or not more than seven on penalty of forfeiture, and eventually extended to the Congaree River. A later act permitted sale to a private corporation, with the stipulation that 1,500 hp. be furnished free to the State, the city of Columbia and an individual.

The Columbia Railway, Gas & Electric Company acquired title from the grant. In 1917 the Legislature pussed a bill for recovery of the canal by the state on the ground that the canal had not been extended to the river. The State Supreme Court sustained this act and declared the canal forfeited for non-performance of contract.

In reversing this decision, the United States Supreme Court declared that as there was no penalty clause attached to the original act, as to extension to the river, and as other conditions have been met, the South Carolina act of 1917 was unconstitutional and that title to the canal is properly vested in the Columbia Company.

Utility Bill Introduced in New York

Membership of the Up-State Commission Would Be Reduced from Five to Three—Right to Fix Rates Rescinded—Municipal Ownership Provisions Included in Measure

THE administration at Albany, N. Y., has placed all of its eggs in one basket in its feature measure introduced by John J. O'Connor in the Assembly, in that it is both n ripper bill and generally divests the commission of the powers conferred upon it by the legislation of 1921 and 1922.

The measure is entitled "An act to amend the public service commission law, in relation to membership and powers of the commission." In the first part of the bill, the "ripper" part, section four of the public service commission law is amended to provide that the public service commission shall consist of three instead of five members, and that the term of office shall be six years instead of ten, the commissioners first appointed to hold office, one until Feb. 1. 1924, and the term of one commissioner shall expire on Feb. 1 of each second year thereafter.

If this measure passes, the Governor will appoint three new commissioners to take the place of the five now in office, who would be automatically legislated out of office. Under the terms of the bill, however, the power of removal is left as it is "by concurrent resolution of both houses of the Legislature if two-thirds of all the members elected to each house concur therein." This section as amended turns the control of the public service commission and its patronage over to the administration.

STRIPPING THE COMMISSION OF ITS POWERS

Under chapter 134 of the laws of 1921, the Legislature delegated its powers of raising or lowering a rate, fare or charge, regardless of the existence of any statute to the contrary, to the commission,

There are four general subjects of regulation treated in the public service commission law: railroads and street railroads; gas and electric corporations; steam corporations; telephone and telegraph corporations. The regulatory provisions of law to each of the four subjects are very similar in language but adapted to the requirements of the different utilities.

Under the new bill, section 29 relating to railroads, street railroads, etc., has been amended by striking out the provision that "the commission may as authorized by subdivision one of section 49 establish temporary rates for any period of suspension under this section."

Subdivision 1 of section 49 is amended by striking out the provision that "the commission shall with due regard among other things [to the estimated prospective earning capacity of such property at the rate of fare at the time fixed and existent] and the provision notwithstanding that a higher or lower rate, fare or charge has been heretofore [prescribed by general or special statute, contract, grant, franchise, condition, consent or other agreement] authorized . . . shall fix the rate, etc."

The intent of this amendment is to revive to the commission the mandatory obligation to consider previous agreements, franchises and general or special statute in fixing rates and charges.

Section 66 subdivision 5 of the law relating to gas and electrical corporations has been amended:

"The commission shall determine and prescribe . . . the just and reasonable rates . . . notwithstanding that a higher [or lower] rate or charge has heretofore been prescribed by [general or special] statute [contract, grant, franchise, condition, consent or agreement]."

Subdivision 12 of section 66 has been amended by striking out the provision "unless the commission shall establish a temporary rate or charge as authorized by section 72 of this chapter."

Section 72 relating to order fixing price of gas or electricity has been amended:

"After a hearing . . . the commission may, by order fix [just and reasonable prices, rates and charges] the maximum price for gas and electricity not exceeding that fixed by statute to be charged . . . [not-withstanding that a higher or lower price has been theretofore prescribed by general or special statute, contract,

grant, franchise condition, consent or other agreement.]"

It also eliminates this provision from the law:

"Any such change in price shall be upon such terms, conditions or safeguards as the commission may prescribe. It it shall be made to appear to the satisfaction of the commission that the public interest requires a change in the price of gas or electricity charged by any such person or corporation, or that such change is necessary for the purpose of providing adequate and efficient service or for the preservation of the property, the commission, upon such terms, conditions or safeguards as it deems proper, may authorize an immediate reasonable, temporary increase or decrease in such price pending a final determination.

Subdivision 10 of section 80 which relates to steam corporations is amended so as to prohibit the commission from establishing a temporary rate or charge; and section 86 is amended by providing that the commission within lawful limits may, by order, fix the maximum price of steam not exceeding that fixed by statute and striking out the law "notwithstanding that a higher or lower price has been theretofore prescribed, etc."

TELEGRAPH AND TELEPHONE

Subdivision 2 of section 92 of the public service commission law is amended by striking out the provision allowing the commission to establish temporary rates, charges or rentals, for any period of suspension, etc., and providing "at any hearing involving [a change] an increase or a proposed [change] increase of rates, the burden of proof to show that the [change] increase of proposed [change if proposed by the corporation, or that the existing rate, if on motion of the commission or in a complaint filed with the commission it is proposed to reduce the rate,] increase is just and reasonable shall be upon the corporation [charging] increasing or proposed such [change] increases.

(Note: Matter in roman old law; matter in brackets stricken out; matter in italics new.—EDITOR.)

Within thirty days after this act takes effect, the Governor is to appoint three new public service commissioners who are to take the place of the five now in office.

The intent of this measure is to make the public service commission consider in fixing a rate, fare or charge a contract, agreement, franchise or ordinance previously had or a general or special statute and not to allow the commission to raise a rate or charge in contravention of any such. Whether this is accomplished or not, however, is a question.

The Legislature in 1921 repealed by implication all existing statutes fixing rates, fares and charges and delegated to the commission the right to fix and adjust the same just as if it were the Legislature itself. The bill now proposed does not specifically restore to the law the statutes and agreements

which by the law of 1921 were summarily swept aside; it takes away from the commission its legislative powers so that the commission cannot restore them. The Legislature has not by this bill at least attempted to do so.

The question arises, could the commission, operating under the amended law, use general or special statutes, franchise contracts or agreements as a basis for rate fixing as such franchises and laws are not restored in effect by this measure?

Buffalo Hearing to Be Resumed on March 6

The Public Service Commission of New York has fixed March 6 as the date for the resumption of hearings before Commissioner Pooley in Buffalo on the service and rate case instituted by the municipal authorities against the International Railway. Buffalo seeks a return to the 5-cent fare but some members of the City Council favor a service-at-cost proposal.

Herbert G. Tulley, president of the International, has sent a letter to Mayor Frank X. Schwab saying that under the present relations between the city and company a service-at-cost plan is impossible. The letter says in part:

Any service-at-cost plan would be made impotent by use of municipal or other private huses, because the possibility of better service and lower fares would, in either event, be dissipated by the waste in duplicated service. The company is desirous of reaching a settlement with the city, by which the hest of service may be supplied for the lowest possible fare. To secure this desired result city and company must necessarily co-operate so as both to increase and conserve the company's revenues.

This company, if the city so desires, will undertake to operate a motor bus line on Dalaware Avenue, from Church Street to Amherst Street, for a 10-cent fare with a 3-cent exchange to connecting street cars, and a motor bus line on Bailey Avenue, from Broadway to Kensington Avenue, for a 7-cent cash fare, or four tickets for 25 cents with free transfers to connecting street cars.

In referring to the plea for motor routes, Mayor Schwab says that this matter is now waiting for a public hearing. The hearing is set to be held on Feb. 23.

Accidents in Indianapolis and Louisville

A second serious grade crossing accident within thirty days occurred on the morning of Feb. 13 when a Louisville & Nashville Railroad double-header train crashed into a big Fourth Avenue car of the Louisville (Ky.) Railway at Fourth and A Streets, where there is an unprotected grade crossing, indicated merely by a swinging signal device. The car had just left the carhouse northbound and had only taken on four passengers. As a result of the accident two people were killed and four injured. The crew of the car escaped with minor injuries, being on the head end, which had passed over the crossing.



Car Overturned in Indianapolls

In an accident on the Indianapolis Street Railway recently the front end of one car was demolished and another car was thrown over on its side. Four persons were injured. A College Avenue car crashed into a Twentyseventh Street car as it crossed the southbound tracks into a loop. Slippery tracks are said to have made it impossible for the motorman on the car which was struck to get enough traction from the rails to move his car quickly so as to escape the collision when it was seen the other motorman could not stop his car. Of those injured, two were passengers and two were members of the car crew which struck the other car.



Passenger Train Hit Fourth Avenue Car in Louisville

Buffalo Strikers Plead Not Guilty

State Senator Robert C. Lacey and thirteen of the fourteen striking street car men indicted by the Federal Grand Jury in connection with the dynamiting of the Buffalo-Niagara Falls high-speed electric train on the International Railway last August, appeared before Federal Judge John R. Hazel and entered pleas of not guilty. Vincent F. Tuero, financial secretary of the Amalgamated, who also is under indictment, was sick and unable to plead. He will be arraigned later. State Senator Lacey also was indicted on a perjury charge.

James H. Vahey, Boston, general counsel for the Amalgamated Association, will assist in the defense of the strikers when they are brought to trial at the April term of United States Court in Buffalo. Ernest W. McIntyre will be the trial lawyer for the prisoners.

Counsel for the striking car men asked the court to direct the government to elect which of the conspiracy indictments would be tried. He argued that inasmuch as they are both for the same offense, one should be dismissed. The court postponed argument on the motion until the return of District Attorney William J. Donovan, who is now in Europe. Counsel for the car men asked permission to withdraw the not guilty plea at some future time and enter a demurrer.

\$75,000,000 Power Program Under Way in Ohio

According to the Ohio Committee on Public Utility Information a tentative program is under way involving the expenditure in Ohio of a sum in excess of \$75,000,000 during the next three or four years, for the purpose of building additional facilities for the generation and distribution of electricity to meet demands in that State.

This program, part of which will be actually carried out during the present year, involves the establishment of an Ohio super-power zone system that will link together most of the great electrical central generating stations of the State. Practically every large city in the State will be affected.

Before the end of 1923, electricity generated down on the Ohio River will meet with electricity generated on the ahores of Lake Eric, by reason of physical interconnection between the properties of the Cleveland Electric Illuminating Company, the Northern Ohio Traction & Light Company and the American Gas & Electric Company, operating through its subsidiary, the Ohio Power Company.

Actual construction on this project is now well under way, as is also another interconnection that will link with this power zone the properties of the Ohio Public Service Company, which is already tied in through the Lake Shore Electric Railway, with big generating plants of the Toledo-Edison Company.

This means that by fall there will already have been built a super-power

system for the entire eastern half of the State and that whole portion lying along Lake Erie stretching from Cleveland to Toledo. In addition to this. engineers have already begun calculations to determine how the properties of the Union Gas & Electric Company at Cincinnati, might be hooked up so that they could carry current up as far as Columbus. In this scheme is also involved the problem of linking in the Dayton Power & Light Company, which serves many towns in the southwestern part of the State, and the Consolidated Light, Heat & Power Company, of Huntington, W. Va., which company serves communities in the southeastern part of Ohio and in West Virginia.

Meeting Reveals Progress of Plan

The plan to operate interurban cars of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad into the heart of Cincinnati, Ohio, is well under way, it was revealed at a meeting on Feb. 17 of the Hamilton County legislative committee. delegation of business men, headed by Charles A. Hinsch, president of the Fifth-Third National Bank, appeared before the committee and presented a bill for amendment of present laws that would facilitate the entrance of the traction company to the Dixie .Terminal from its present terminus at Anderson's Ferry. The measure of Mr. Hinseh and his constituents urged that the Ohio Legislature give the Council of Cincinnati the right to grant a franchise permitting an increase in fares on the extension. Members of the legislative committee present agreed to urge passage of the bill and explain its purpose to the Legislature.

The law prohibits a franchise for more than a 5-cent fare on railways that use elevated tracks over any of the city streets. Unless that section of the law is repealed or changed, the traction company would have to convey passengers for 5 cents.

The traction officials said that they could not operate their cars to the Dixie Terminal on a 5-cent fare without losing money. The petition presented to the legislators was emphatic in its assertion that the present law would "forever prohibit the construction of elevated tracks in any Ohio city and would hinder traction progress."

Mr. Hinsch spoke of the financial considerations involved, and the convenience of residents of the lower-river towns was the theme of L. B. Patterson and H. Lee Early, directors of the traction company.

Several months ago directors of the Cincinnati, Lawrencehurg & Aurora Electric Street Railroad announced their intention of bringing the line into the heart of Cincinnati by using the right-of-way of the Big Four Railroad and the construction of elevated tracks over Mill Creek and the streets in the "bottoms."

The building of the extension would

enable many thousands of buyers from southern Indiana municipalities to come to the heart of Cincinnati's shopping district without change of cars or other inconvenience. At present those who come have to change cars at Anderson's Ferry.

Nothing to Arbitrate, Says Mitten

T. E. Mitten, chairman of the board of directors of the International Railway Company, Buffalo, told Governor Smith there is nothing to arbitrate and the Governor is now convinced that any investigation by the State Industrial Commission into the causes of the str.ke last July would be a mere waste of time. The investigation by the state was asked by a delegation of strikers and labor leaders.

Governor Smith issued a statement after the conference with Chairman Mitten of the board in which he said:

It is only fair to the strikers to say that such an investigation will not amount to anything. From what Mr. Mitten said I am convinced he will never consent to arbitrate and he seems to be a man who means what he says. Mitten told me that before he would consent to negotiate with the union, he would give the road to the men who are now running it. When a man takes that position how are you going to find anything to arbitrate?

The Mitten plan has gone into full operation on the local and interurban lines of the International. The emergency provision brought into existence by the strike, under which loyal employecs were guaranteed ten hours pay every day, or \$5.50 per day, has been abandoned as of Feb. 15. Under the new regulations the men have gone on straight platform time. Men with regular runs will be guaranteed the opportunity to work up to ten hours per day. Men not regulars will receive two hours pay for showing up in the afternoon. Any runs that they get will be paid for at the regular rate in addition to the pay for showing up.

President Herbert G. Tulley announced that the wage schedule will be 50 cents an hour for the first three months of employment with a 3-cent raise for the next nine months and 55 cents an hour thereafter. When the new men were employed they were told that when the strike emergency ceased, they would be placed on regular platform time.

Commerce Commission Will Hold Hearing on Terminal Issue

Richard Sachse, chief engineer California State Railroad Commission, has returned from Washington, D. C., where he went in connection with the application of the State Railroad Commission to the Interstate Commerce Commission for a decision on the matter of a union terminal at Los Angeles for the steam road and electric interurban lines entering Los Angeles. In view of the fact that the California State Supreme Court on two hearings overruled the State commission in its order on the railway lines to construct the terminal, that commission saw fit to appeal to the Interstate Commerce Commission.

Will Vote on Fare Increase

Electors of East Liverpool, Ohio, on Feb. 27, at a special election, will vote on the councilmanic ordinance granting the Steubenville, East Liverpool & Beaver Valley Traction Company a fare increase.

Arguments for and against the passage of the ordinance were recently mailed to 9,000 voters in the city of East Liverpool. The arguments are mandatory under the provisions of the referendum law. The registration of voters for the special referendum vote has been light, but in view of the fact that hundreds of voters registered at the last election a heavy vote is anticipated. Since May 1 of last year the traction question has been of paramount importance in the city of East Liverpool.

No cars have operated within the city limits of the pottery city since May 1, 1922, and the question of restoring car service, in a measure, may be considered dependent upon the approval of the ordinance by the voters.

It is the general belief that if the fare increase is granted the officials of the traction company may consider a resumption of negotiations with their employees who walked out last May.

Interurban cars of the Steubenville, East Liverpool & Beaver Valley Traction Company are operating outside the East Liverpool city limits, non-union men being in charge of the cars. They have been operating for some time, but there has been no interference, the union men declaring when the announcement was made that service would be resumed that they would in no way interfere.

Delicate Sensibilities of Hoosiers Outraged?

Indiana is all het up. Every once in a while a prophet of the plain people arises in Indiana filled with the ambition to turn things topsyturvy. Not so long ago it was Mayor Shank of Indianapolis who occupied the limelight. Now it is the members of the Board of Public Works of Indianapolis. The sensibilities of these gentlemen and some others are being outraged, it seems, by the fact that long trains of live stock are being handled by the electric interurbans. In consequence a bill has been introduced in the Legislature to prohobit the hauling of live stock or other freight by traction lines through the streets of any city in the State. The bill permitting this practice was enacted at the 1920 special session of the Legislature, largely through the support of the farmers' organizations.

As just indicated the story of hauling cattle dates back to the stressful days of 1918 when the farmers were sore put for means of transporting their cattle. When fear for the ways and means of supplying food was felt the interurbans were induced to ship cattle, though they were reluctant to do so. The scheme has proved successful and has developed, in the opinion of the county

agents of the agricultural interests. It has added to the meat supply and at lowered costs. In 1921, for instance, the Terre Haute, Indianapolis & Eastern Traction Company handled 402 cars of cattle. The editor of the Terre Haute Tribune considers this a record of which not only the company but the State may well be proud. In a recent editorial that paper said in part:

that paper said in part:

Of late there has grown up a disposition to criticise the traction lines of the State for hauling cattle through the streets of the cities through which the interurban lines pass. Terre Haute is participating in this. While it is no new subject, it seems that it has just occurred to a lot of people to find fault therewith. And behind it all there is quite a long story.

Back in 1918, during the war, the farmers were sore put. In fact, all classes of people were sore put. If no cattle was shipped there would be no supply of meat for food. The case looked critical. Leaders in public thought induced the interurban lines to make the experiment of shipping cattle. Cars for the purpose were bought. Cattle shipping pens were built along the lines. The method was a success, and was halled as a boon to the farmers. The scheme was not born of the greed of the traction lines. In fact, it is generally known that they undertook the work with some reluctance. It affords quick transportation; it saves the farmers an enormous amount of money on the weights of their stock; it is acclaimed by county agents who certainly are well meaning in their efforts to develop the agricultural interests of a community, and last but not least, it adds to the meat food supply and at lowered costs.

It may offend some tastes to see a cattle car go through the streets on the interurban tracks, but the thing is too important to be so jauntily disposed of. People who take snap judgment on these matters simply are deficient in fundamental knowledge. A cattle car may not be the most enticing or alluring thing on the horizon. But it can nearly always demonstrate its utility beyond a shadow of a doubt.

News Notes

Name of Department Changed .- The name of the claims department of the Indiana, Columbus & Eastern Traction Company, Cincinnati, Ohio, has been changed to the safety department. H. P. Smith continues as director in charge, with headquarters in Springfield, Ohio.

Money for Rehabilitation Increased .-The amount of money to be spent in putting the Goldsboro (N. C.) Electric Railway system in operation to be voted on at a general election has been increased from \$35,000 to \$40,000. The sum was advanced due to a loss of \$5,000 in a carhouse fire.

Keeps Line Open During Blizzard .-All traffic, including train service and mail service, was tied up recently in western Michigan as a result of the worst blizzard which that section had experienced in several years. The city of Holland would have been cut off from the rest of the world except for the line kept open by the Michigan Railway.

1923 Expenditure \$8,000,000.—Public utility statistics recently compiled in the State of Tennessee show that electric light and power companies, street railway, gas and telephone companies in the state will spend \$8 350,000 during 1923 for extensions and improvements. This sum is in addition to \$2,-000,000 more for replacements and renewals.

The One and Only Car to Go .- Bellefontaine, Ohio, likely will lose its only street car-a one-man car operated over the tracks of the Indiana, Columbus & Eastern Traction Company's lines in the city limits. Traction line officials have asked permission of the Council to discontinue service because the car was a losing proposition, and the Council has indicated that the permission will be forthcoming. The car has been in operation for about fifteen years.

Railway Companies Order Buses.-On Feb. 16 the Pacific Electric Railway and Los Angeles Railway Companies placed an order with the White Auto Company for eighty Model 50 motor buses. The purchase price of the big consignment is \$550,000. Some of these new buses, the railways announce, will be jointly operated by the two street railway companies and others individually, but all will be used to supplement the street car and interurban service furnished by the two corporations in Southern California.

25,000 Miles Without Accident .- Four motormen of Green Bay, Wis., have set a record safety mark. The big record was made by Henry Erdman who operated a car through the streets of the city for 25.000 miles without one accident, without one report and without one complaint. The three other motormen who equalled this safety showing operated interurban cars. The company paid out \$1,089 in bonus awards during the three-quarters of a year that the bonus plan was in effect. The awards are based on courtesy, safety and service.

Leaves Transit to Mayor .- The City Council of Philadelphia, Pa., wants the Mayor to handle the entire transit situation. Councilman Charles B. Hall on Feb. 15 presented the resolution instructing Mayor Moore to call meetings of city and company engineers to determine the proposed high-speed routes. The resolution then requested that negotiations take place with the president of the Philadelphia Rapid Transit Company, looking toward an operating agreement for the Broad Street subway. Previous to this recommendation the Councilmen had rejected the Mayor's solution. The Mayor has passed no comment upon this action of the City Council.

Western Hold-Up. - Two Stage masked bandits, each armed with two revolvers, held up and robbed twenty passengers and the crew of an interurban car on the Martinsville division of the Terre Haute & Eastern Traction Company just south of Indianapolis recently. The men staged a regular Western hold-up, firing several shots into the car and, after the motorman slowed down, pulled the trolley from the wire, bringing the car to a stop. No one was injured. Cash, jewelry and valuables to an estimated value of more than \$1,000 were obtained from the passengers and crew after they were ordered out and lined up along the tracks and searched. One suspect is being held by the police.

Financial and Corporate

Pittsburgh Accounting Ordered

Another Move Made Toward Restoring the Pittsburgh Railways, Now in Receiverships, to Its Owners

An accounting of the receivers or the Pittsburgh (Pa.) Railways probably will be filed in Federal Court by March 1 as the first step toward the dissolution of the receivership and the reorganization of the company. This was indicated by C. A. Fagan, W. D. George and S. L. Tone, the receivers. on Feb. 15, following the filing of a petition in Federal Court by A. W. Thompson, president of the Philadelphia Company, acting as president of the Pittsburgh Railways, asking for the accounting and the return of the property to the railways company.

The petition asks that when the account is filed it be referred to a master appointed by the court to determine its correctness, and that a reasonable time be given all claimants

to present their claims.

The petition states that the company has made arrangements to borrow \$5,000,000 from the Union Trust Company, Pittsburgh, provided it can repossess itself of its property. Of this sum, \$3,000,000 will be used for the purchase of approximately 300 new cars and \$2,000,000 will be used for improvements and betterments which are calculated to increase earnings and enable the company to operate the system at a profit. Financing will be accomplished through the issuance of \$3,000,000 in car trust notes and \$2,000,000 in four-year 6 per cent notes, with a ainking fund of \$500,000 a year.

The petition states that, at the present rate of earnings, it would take the receivers a great many years to pay their obligations, and even an increase in fare would not be effective on account of the diminishing returns which result in such action.

The reorganization is to be accomplished under an agreement already made by the city of Pittahurgh, the Philadelphia Company and the Pittsburgh Railways. This agreement provides for a reorganization by Philadelphia Company, at a capitalization of \$62,500,000, and stipulates a traction conference board for the control of all financial matters. This board is to be composed of representatives of the city of Pittsburgh, the boroughs through which the traction lines pass, the Philadelphia Company and the Pittshurgh Railways.

All pre-receivership claims are to be paid over a ten-year period and without interest. The petitioner is also entitled to receive sufficient operating expenses to enable it to maintain its property in good condition. All the

larger creditors, such as incorporated bodies, have been induced to accept Holders the ten-year-payment plan. of a number of claims for personal injury received before the receivers took charge have been asked through their attorneys to accept the same plan of payment. These claims are from 266 persons, and amount to approximately \$750,000.

Shore Line Sale Arranged

The part of the Shore Line Electric Railway between New Haven and Savbrook, Conn., about 30 miles distant, which has not been in operation for several years, has been purchased by A. William Sperry, New Haven, for \$140,000, of which \$5,000 was paid immediately and the balance is to be paid within thirty days after the Connecticut Legislature grants a charter to Mr. Sperry. The sale was made by Robert W. Perkins, the receiver, and has been confirmed by the Superior Court.

New Haven capital became interested in the plan for the rehabiliation of this road because it was a substantial feeder to the mercantile and industrial establishments in New Haven. It runs through the towns of East Haven, Guilford, Branford, Madison, Clinton, Westbrook and Saybrook, and the purchase includes all its property in those towns, its power stations, buildings, machinery and equipment. Considerable work of reconstruction will be required. The road was built by the late Morton F. Plant.

City Expert's Value \$29,805,956

Differences Among Railway, Commission and City Experts Over St. Louis Valuation Not Violent Until Realm of Intangibles Is Entered— Company's Claim \$70,000,000

FOLLOWING the submission of the city's appraisement of the valuation of the United Railways, St. Louis, at \$29,805,956, as opposed to the receiver's claim of \$70,000,000 value, the argument of the case before the Missouri Public Service Commission has been set for March 8. In the meantime the company's counsel will file a brief.

The present tentative valuation upon which car riders are paying a 7-cent

fare is \$50,000,000.

The city's figures are named in a brief just sent to the Public Service Commission by Judge Henry S. Caulfield, who has continued to act in this case as special counsel since his retirement from the office of City Counselor. The commission now has before it the following valuations to guide it in reaching a decision which is expected in a few months:

By the company: Historical cash investivent, \$77,632,428; historical cost, \$86,440,697; reproduction value at a five-year average price of materials, \$87,440,697; reproduction cost as of June 30, 1921, \$100,722.813; reproduction cost as of Jan 1, 1920, \$103,100,511. The company declares that in view of all these values it should be allowed \$70,000,000 valuation.

By the Commission's Engineers; By the Commission's Engineers: Reproduction coat on average material prices existing between 1906 and 1918, \$47,970,841; reproduction coat, less depreciation, \$34,285,531. These figures do not include any allowance for intangibles such as promotion and going value which, if the commission chooses, it may add.

By the city: \$29,805,956.

The three interests agree upon the items of physical property represented in the railway system. They begin their calculations from the same inventory. As is usual in all public utility valuations, they reach widely diverging eonclusions by invoking radically different theories of extensions of that inventory and by the inclusion or exclusion of various items of overhead.

For instance, the city keeps in virtual agreement with the commission's engineers until it reaches these over-The company continues in heads.

agreement only until the valuation of land is taken up. It then asserts a valuation more than \$1,000,0000 higher for this item than the commission's engineers and the city assert.

Even, then, the difference is not violent until the realm of valuation theories is entered. At that point, by asserting that it should benefit by the rise in prices, the company estimates such items as \$5,000,000 for promotion costs, and like sums for "going value" and "cost of consolidation."

Meanwhile the commission's engineers have maintained that wartime and post-war peak prices are not admissible and the average over a long term of years is proper. In this the

city supports them.

However, the commission's engineers and the company adopt the same percentages for overhead costs during construction and arrive at different sums for these charges only because the company applies them to slightly higher inventory extensions. Mr. Caulfield in behalf of the city takes emphatic exceptions. The items and the sums claimed for them by the three parties at interest follow:

Law expenses and miscellaneous: Company, \$2,072,177; commission's engineers, \$1,901.954; city, \$1,048,548.
Engineering and auperintendence: Company, \$1,703,921; commission's engineers, \$1,609,404; city, \$973,790.
Interest during construction: Company, \$2,194,223; commission, \$1,356,680; city, \$174,758.
Taxes: Company, \$342,856; commission's engineers, \$282,290; city included with interest during construction.
Omission and contingencies; Company, \$1,389,497; commission's engineers, \$1,350,-874; city, none.

cily, no 874; city, none.
The totals of the items are: Company, \$8,002,967; commission's engineers, \$7,387,-693; city, \$2,721,370.

In discussing his opinion of these overhead costs during the remote period of original construction, Mr. Caulfield saya:

The allowances made by the commis-sion's engineers must be rejected. They are purely imaginative and speculative. They are made merely upon the assumption that

they must have been incurred and the sums are arbitrary engineers' percentages. There is no proof by the utility that they were incurred. They are not based upon actual expenditures, but merely upon what such expenditures might have been. They are allowed on improvements and betterments made piecemal, as well as on original construction. They are allowed on the theory that if the property were now reproduced as a whole they would be necessary. There is no evidence of actual expenditure. Undoubtedly the proper course for the commission would be to refuse to include any overheads during construction.

He adds that if the commission feels that some allowance should be made. the percentages set up by the commission's engineers and adopted by the company should be cut from a total of 19.44 per cent to 7.5 per cent.

Mr. Caufield Against Allowances FOR OMISSIONS

Mr. Caulfield makes clearer his opposition in discussing of some of the individual construction overhead items. He declines flatly to entertain any allowance for omissions and contingencies. The theory of the company and the commission's engineers is that in so large an inventory, there must necessarily have been some omissions. Mr. Caulfield points out that the engineers of the commission were aided by a large valuation staff of experts employed by the company, and that in co-operation they made very minute examination of the property and search in the books for all items. He declares that their zeal makes it probable that it is absurd to assert as the company and commission's engineers do, that 5 per cent, or 25 miles of track might have been overlooked, and that 3 per cent, or 42, of the company's cars were not listed.

On other of the items, he asserts that if these overheads had been incurred they would be found on the company's books. Either they were not incurred. he cites, or when incurred were in such small amounts that they were charged directly to operating expenses, which were paid for by the fares of the car riders and not by capital investment. There is considerable difference between overhead construction costs for a brandnew property and for property that grows up by the piece in the course of ordinary maintenance and created during the ordinary routine work of the company. In such work there is no cost directly traceable to engineering and superintendence other than that directly included in the cost, nor for organization, nor law expenses, nor interest, nor taxes, nor insurance, nor for other overheads admissible to a valuation except injuries and damages.

Mr. Caulfield objects to the sum allowed for working capital, that of the commission's engineers and the company being identical, \$2,585,015. this sum, approximately \$1,000,000 is cash. Mr. Caulfield points out that the business of a railway is cash and that it requires no cash that is not provided as fast as its needs accumulate by the fares of the car riders. He deducts the cash item.

He scouts the claim of the company for \$5,000,000 for each of the items "promotion cost," "going value" and "cost of financing." On the cost of financing, he declares that there is no evidence in the case that any sum whatsoever was paid to bankers and brokers and cites court decisions to show that inclusion would be improper if the expenditures had been made. On promotion, he declares that there might be need for promotion if a system such as the United Railways were to be created at one time, but "were promoters required when the Sarah Street line, the Union Avenue line or the recent City Limits line were built." He pointed out that the company expanded and grew in the course of its routine existence.

"Going Value" is dismissed with a statement that the United States Supreme Court has held that it has no place in valuation for rate-making. Similarly, the item \$11,536,385, asserted by the company to have been the cost of consolidating the various systems into one, is stamped as an effort to value something that is admittedly The sum is the difference bewater. tween the market value of securities given to the bankers who effected the consideration and the sum realized by the company from its total issue.

Mr. Caulfield summarizes his valuation as follows:

All physical property and fran- chises except working capital Construction overheads Working capital	\$38,308,101 2,621,371 1,915,405
Total as of Dec. 31, 1918 Additions to property and plant, Jan. 1, 1919, to Dec. 31, 1920	\$42,844,877 604,039
Deduct depreciation	\$43,448,916 13,034,674
Final value as of Dec. 31, 1920 Deduct non-carrier property	\$30,414,241 608,284
Final value of carrier property	\$29,805,956

In addition Mr. Caulfield fixes the value of the Missouri Electric Company, the name under which the county lines are operated, at \$447,738.

Aside from its importance as the sum which in the future riders of St. Louis must furnish a "fair return" above all operating costs, the valuation about to be fixed likely will be employed in terminating the receivership and reorganizing the company.

The net earnings for 1922 of the United Railways were \$3,222,325, or approximately 6½ per cent on the tentative valuation of \$50,000,000. The railways carried 286,076,475 passengers and had a gross income of \$19,963,555.

\$1,829,277 Net for Philadelphia Transit

Mitten Men and Management Earned and Paid Dividends of \$1,800,000 and Also Earned and Paid \$1,650,000 Co-operative Wage Dividend-Road Ahead a Hard One

THE report of the Philadelphia (Pa.) Rapid Transit Company for the year ended Dec. 31, 1922, presented to the stockholders on Feb. 19, shows a net income of \$1,829,277 compared with \$1,807,292 for 1921. The comparative statement for the two years follows:

PHILADELPHIA RAPID TRANSIT COMPA 1922 1921 Gross passenger earninga \$41,758,763 Other operating revenue 770,780 905.	,830 ,775
Gross passenger earnings \$41,758,763 \$41,514.	830 775
Gross passenger earninga. \$41,758,763 \$41,514 Other operating revenue. 770,780 905	775
Ry. operating revenue 42,529,543 42,420, equipment and power—maintenance, renewals	605
and depreciation 8,560,400 8,560,	400
Power operation 3,475,307 3,252,	188
Conducting transports-	
tion	470
General. 3,548,378 3,291,	709
Taxes, including paving tax	822
31,553,517 31,233,	589
Operating income	016 435
11,682,455 11,677,	45 i
Interest 1,020,090 1,029	245
Rentals 8,683,087 8,720	
Sinking fund—city con-	,000
9,853,177 9,870	158
Net income	293

In his remarks to the stockholders President Mitten referred to the organization changes noted elsewhere in this issue as a result of which he will be succeeded as president by W. C. Dunbar but will continue as chairman of the board. He also said:

P. R. T. stockholders, at the 1922 annual meeting, assented to the Mitten proposal

that a co-operative wage dividend should be paid to the employees of the company after the P. R. T. dividend had been earned. Mitten men and management, by super-co-operation, together earned and paid four quarterly dividends of 1½ per cent each totaling 6 per cent, or \$1,800,000, on P. R. T. stock for the year 1922, and also earned and paid the 10 per cent co-operative wage dividend of \$1,650,000 to the employees.

earned and paid the 10 per cent co-operative wage dividend of \$1,650,000 to the employees.

The co-operative wage dividend fund has been invested by the men in 55,000 shares of P. R. T. stock, par value \$50 per share, bought by the trustees of the co-operative wage dividend fund in the open market, and which, at the price paid, \$30 per share, represents an investment paying 10 per cent per annum so long as P. R. T. pays its dividend of 6 per cent per annum.

P. R. T. employees, at the midwinter meeting, gave such assurance of continued super-co-operation, as to justify the continuance of the same 10 per cent co-operative wage dividend during 1923, which continuance will be presented for acceptance at the annual meeting of P. R. T. stockholders.

Super-co-operation during 1922 was surprisingly effective in reducing labor costs. The comparative result hereunder is enlightening:

Boston is operated by public trustees.

The comparative result in the comparative result is lightening:
Boston is operated by public trustees, with union working conditions enforced. Its labor cost is 3.61 cents per passenger

Philadelphia is operated by men and management, co-operating for economic accomplishment. Its labor cost is 2.23 cents per passenger carried, which cost includes the co-operative wage dividend.

Philadelphia carried 848,883,512 passengers during 1922. Its labor cost of 2.23 cents per passenger, compared with Boston's labor cost of 3.61 cents shows P. R. T. savings from greater efficiency to be \$11,714.592.

W. C. Dunbar, vice-president in charge of finance, in reporting to President Mitten said in part.

President Mitten said in part:

Income account for 1922 shows net income of \$1,829,277 available for the \$1,800,000 dividend of 6 per cent on \$30,000,000 P. R. T. capital stock. Car schedules now in effect provide 10 per cent better service than one year ago, representing an added cost of approximately \$1,000,000 per annum; this in accordance with the policy to use earnings of present fare over dividend requirements to increase service.

STATEMENT OF AVERAGE FARE AND PASSENGERS CARRIED BY PHILAD LIFRIA RAPID TRANSIT COMPANY

Caleralar Fare for Pare 1910 4 15c 4 1911 4 00 1911 4 01 1915 1 94 1916 1 1916 4 01 1916 4 01 1916 4 01 1916 4 01 1916 4 01 1918 4 01 1918 4 01 1918 4 01 1918 4 01 1918 4 00 1921 4 95	Total Revenue And Transfer Pamertigere 443,204,502 512,697,476 549,674,685 580,011,057 581,297,949 594,220,409 609,008,258 726,936,340 763,008,395 866,944,336 906,462,135 836,547,151 846,683,512	3-Cent Exchange Passengets 21,285,569 24,795,479 25,684,210 26,784,380 27,119,344 27,221,024 31,939,375 36,710,434 43,791,210 51,675,791 55,233,232 51,761,227 55,206,600	Per Cent Total 4 80 4 79 4 67 4 62 4 67 4 58 4 77 5 05 5 74 5 06 6 08 6 19 6 50	Free Transfer Passettigers 67,281 688 84,363,551 93,072,322 101,319,056 107,908,712 114,620,321 127,990,031 130,472,269 149,427,164 154,079,623 151,17,155,870	Per Cent Total 15 18 16 30 16 30 17 47 18 56 19 19 19 13 18 79 17 14 16 96 18 96 18 38
1922 4 91	848,003,312	33,200,000	6 30	-	_

P. R. Thus paid 6 per cent in four quarterly dividends for the year 1922, and has included in the wages paid to F. R. T. employees a 10 per cent co-operative wage dividend amounting to \$1,650,000. This payment is well carned and properly paid, as the added production of F. R. T. employees saves Philadelphia car riders many million dollars annually.

Hakanes sheet of Loc. 31, 1922, shows that in addition to cash working capital of \$1,410,118, there is \$3,669,500 of cash in the reserve fund for renewals. This reserve fund will be drawn on during 1923 in excess of \$2,500,000, to meet cash down payments on the 578 new cars, the cost of substation equipment, and other projected improvements.

P. H. T. basis of appropriation from earnings for maintenance, renewals and depreciation, as now in effect, is planned to overcame insufficient upkeep during the war, so that within the five year period 1921-1925, deferred maintenance shall have been picked up, thereafter making possible a fuller use of P. R. T. earnings to meet the anticipated deficit resulting from the operation of city-built lines.

1. R. T. must now overcome a greater loss from the operation of Frankford "L" than the city-company estimate of \$1,000,000 per annum, this because of more duplicate service by surface car routes being required than was originally thought necessary by city-company engineers. Overcoming this loss of more than \$1,000,000 and the payment of \$150,000 rental to the city is made possible only by the 7-cent—four-for-25-cent fare and the assured auper-cooperation of the men in still further reducing the cost of operation.

It is now privately admitted, by those connected with the valuation proceedings, that the value of F. R. T. property is more than ample to Justify continuing the present rate of fare.

Mr. Dunbar says that the recent agitation for a return to the 5-cent fare

Mr. Dunbar says that the recent agitation for a return to the 5-cent fare is unimpressive, since the general desire of the car rider, as expressed to P. R. T. men on the cars, is for more subways, and better service, things impossible with a lower rate of fare. Furthermore as the operation of the Broad Street subway, which the city wants P. R. T. to undertake, will be unprofitable, and must depend, at the outset, on

P. R. T. earnings, the inconsistency of agitating for a 5-cent fare, while the city is urging P. R. T. to assume this loss, is quite obvious.

EQUIPMENT TRUSTS ARRANGED

I'. R. T., through its bankers, Messrs. Dillon, Read & Company, accomplished the sale of \$7,750,000 equipment trusts as follows: Equipment trust series "F" rertificates 6 per cent 1923-1932, \$3,000,000; Equipment trust series "G" certificates 51 per cent 1924-1933, \$4,-

It is explained by Mr. Dunbar that Series "F" completes repayment of Government advances during the war, and covers 210 wartime U. S. Government ears and 500 nearside ears formerly under Series "C," which has been retired. Series "G" covers 520 new passenger and fifty-six utility or work cars, representing a total of \$6,500,000, financed by \$1,750,000 cash down payment from the renewal fund and by sale of \$4,-750,000 equipment trusts. The sale basis of 5.20 per cent to 5.50 per cent was made possible through the improved credit of P. R. T. and its now established banking connection.

Only 1313 suits were pending against the company at the end of 1922, as compared with the 4,953 unsettled suits inherited in 1911 from former management. Only 2.71 per cent of operating revenue was required in 1922 for accident account, as against 6.21 per cent required in 1910.

P. R. T. improvements and additions for 1923, now in contemplation or actually under way, represent the expenditure of more than \$12,000,000.

Changes Announced in the Public Service Company Organization

At the annual meeting of the directors of the Public Service Company, formerly the Hagerstown & Frederick Railway, M. F. Riley was elected president to succeed Emory L. Coblentz, who held the position for twenty-five years and resigned to accept the position of chairman of the board of directors and executive committee of the organization. Mr. Riley was formerly with the American Water Works & Electric Company, part owners of the Public Service Company with principal operating office at Frederick, Md.

The changes in the personnel of the company are in line with the program announced several months ago, at which time the American Water Works & Electric Company became interested in this utility. The financial interest of the local community in the utility remains approximately the same as in the past, while the American Water Works & Electric Company is supplying a large amount of capital for the new developments, it being felt that the local interests, together with that of the American company, will assure success to the future of this company.

At a meeting of the stockholders Mr. Coblentz submitted a detailed report of the year's operations. It showed that last year the company made its best showing. The directors elected were as follows: Emery L. Coblentz, Henry Holzapfel, Jr., Cyrus F. Flook, C. M. Harris, Thomas H. Haller, M. F. Riley, William P. Lane, M. P. Moller, Walter D. Willson Alexander Armstrong, Victor M. Cushwa, D. Ramacciotti, H. S. Bomberger, W. S. Finley, Jr., W. R. Voorhis, J. C. Byron, H. E. Bester, E. Charles Wertheimer, Charles C. Biser, Thomas B. Hayward, G. Mantz Besant, Thomas B. Johnson, C. E. Schildknecht, Guy K. Motter, Charles M. Shank, Grayson H. Staley, George K. Birely, Robert E. Delaplaine, R. J. Funkhouser.

Following this the board organized oy electing the following officers for the ensuing year: Emory L. Coblenta, cnairman of the board and executive committee; M. F. Riley, president; Henry Holzapfel, Jr., and Cyrus Flook

vice-presidents.

	Latest	Month	Ago	Peak	1913	1		Latest	Month Ago	Year Agn	Peak	1913
Street Raliway	1923 6.34	Jan 1921 6.94	Feb. 1922 7.16	May 1921 7.24	4.84	Conspectus	Eng. News-Record Construction costs	Feh. 1923 197.4	Jan. 1923 191.7	Feb. 1922 168.7	June 1920 271.8	1.00
Street Ratiway Materials*	Jan 1923 1 175	1000 1022 174 Jan	Jan 1922 157 Feb	Sept. 1920 247	100	Indexes	U.S. Bur. Lab. Stat. Wholesale Commodities	Jan. 1923 156	Dec. 1922 156	Jan. 1922 138	May 1920 247	100
Street Railway Wagen*	1921 297	1925 207	1922 213	Sept. 1920 232	100	Feb., 1923	Bradatreet's Wholesale Commodities	Feb. 1 1923 13.72	Jan. 1 1923 13.70	Feb. 1 1922 11.42	Feh. 1 1920 20.87	9.21
Steel Untilled orders (Million tone)	Jen 31 1923 6.91	1922 6.73	1922 4.24	1917 12.18	5.91	Compiled for Publication in this l'aper by	Dun's Wholesale	Feb. 1 1923	Jan. 1 [923	Feh. 1 1922	May 1	120.9
U.S. Bank Clearings Outside N. Y. City (Billions)	16.56	1922 14.94	Jan 1922 12.13	March 1920 18.54	Av. 5tn 1913 6.12	Albert S. Richey Electric Railway	U.S. Bur. Lab. Stat.		185.6 Dec. 1922	Jan. 1922	June 1920	
Business Failures Number Lisbilities (millions)	1921 2,165 53,41	1922 1,851 45.84	Jan 1922 2,722 105.7	Jan 1972 2,722 105,7	Av. Mo 1913 1,213 24,84	Engineer Worcester, Mass.	Nat. Ind. Conf. Bd. Cost of living	Jan. 1923 158.1	147 Dec. 1922 158,9	Jan. 1922 161,4	219 July 1920 204,5	(1914) 100

The three index numbers marked with an asterisk are computed by Mr. Richey, as follows. Farce index is average street railway fare in all United States cities with a population of 0,000 or over except New York filty, and weighted according to

population Street Raliway Materials index is relative average price of

materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Protective Committee Formed

Stockholders of the Denver (Col.) Tramway (operating company) and of the Denver & Northwestern Railway (holding company) have formed a protective committee to look after their interests in any reorganization of this utility which has been in the hands of a receiver since Dec. 24, 1920. A number of large holders have already selected representatives, of whom S. M. Perry, president of the Denver & Northwestern Railway and vice-president of the Denver Tramway, is chairman, and the other members are W. N. W. Blayney, Hume Lewis, C. R. Martin and Henry W. Bull. This committee began proceedings in behalf of the stockholders last December and on Feb. 16 issued a formal call to all others similarly situated to deposit their stock with designated trustees.

For a long time there have been two protective committees of the bondholders, who have held meetings from time to time, but the stockholders heretofore have not been active in their own protection. R. M. Perry is secretary of the committee and L. Lewis counsel.

Depositaries are the International Trust Company of Denver, The Illinois Trust & Savings Bank of Chicago, and The Industrial Trust Company of Providence.

North American Declares Stock Dividend

The directors of the North American Company, New York, N. Y., on Feb. 19 announced that the par value of that company's common stock, now \$50 a share, would be reduced to \$10, subject to the approval of stockholders, and exchanged at the rate of five shares of the new stock for each share of the present \$50 stock now held by them.

The directors also have submitted to stockholders a proposal to double the amount of the authorized preferred and common stocks to enable the company to keep its earnings free for distribution to stockholders as dividends, and to be in a position to acquire additional properties.

In addition, the directors declared a quarterly dividend of 21 per cent on the common stock, payable April 2, to stock of record March 1, in the form of common stock, and also announced the regular quarterly preferred dividend payment of 11 per cent, also payable on April 2. In connection with the declaration of the 2½ per cent stock dividend on the common, the company announced that it would pay cash to those stockholders who did not desire a payment in stock on the basis of \$2 for each \$1 par of the stock distribution, or the equivalent of a payment on a 20 per cent annual basis against the present 10 per cent basis.

Auction Sales in New York.—At the public auction rooms in New York this week \$4,000 Columbus, Newark & Zanesville Railway first mortgage 5 per cent bonds were offered, certificate of deposit, 24 per cent; also \$3,000 Colum-

bus, Newark & Zanesville Railway first mortgage 5 per cent bonds, 31 per cent.

Service Temporarily Suspended. — Service on the Ocean City (N. J.) Electric Railroad has been suspended while the cars are being repainted and overhauled for next summer's business.

Operations Ceased. — The Chicago, Aurora & DeKalb Electric Railroad, which for twenty years has been operating between Aurora, Ill., and DeKalb, Ill., ceased operations on Feb. 1. The line was sold for junk, bringing \$90,000.

Abandonment Possible.—The Newark-Granville branch of the Newark & Zanesville Electric Railway, said to have been one of the first traction lines operated in the state of Ohio, will be abandoned if the State Public Utilities Commission heeds a petition of the concern. The line is 6 miles long, and was financed in 1888 by Governor Altgeld of Illinois, a pioneer traction magnate. The company's petition says that \$8,000 was lost in operation last year. If the company's petition is granted service will be discontinued on March 10.

Ninth Annual Report Submitted.— The directors of the Ottawa (Canada) Traction Company have submitted their ninth annual report for the year ended Dec. 31, 1922. The amount received from the Ottawa Electric Railway during the year was \$279,069. This sum paid the usual quarterly dividends of 1 per cent and a bonus of 1 per cent. The report states that the efforts of the Ottawa Electric Railway during 1922 were directed toward the maintenance of the plant and equipment in an efficient condition.

Elects Director .- The Cities Service Company, New York, N. Y., announces that John Gribbel of Philadelphia has been elected a member of the board of directors. Mr. Gribbel is owner of John J. Griffin & Company, manufacturers of gas meters, and is president of the Royal Electrotype Company of Philadelphia and the Athens (Ga.) Gas & Fuel Company. He is vice-president of the American Railways Company of Philadelphia and the American Meter Company of Delaware. Besides numerous other associations, he is a director of many insurance and public utility comnanies.

Official Name Announced.—The York Utilities Company is the official name of the new corporation that has taken over the management of the Atlantic Shore Line Railway in Maine, which serves the towns of Kennebunk, Kennebunkport, Cape Porpoise, Wells, Ogunquit, York, Biddeford, Sanford, Springvale. The new officers are: F. O. Conant, Portland, president; Constant Southworth, Portland, vice-president; George S. Hobbs, Portland, treasurer; Miss Persis B. Hawley, Kennebunk, assistant treasurer; Sterling T. Dow, Kennebunk, general manager and clerk of the corporation.

· Gold Bonds Offered.—The National City Company of New York, N. Y., is offering at 92 and accrued interest, to yield more than 6.65 per cent, \$1,000,000 of the first lien and refunding

mortgage gold bonds of the Southern Indiana Gas & Electric Company. The bonds, known as series B, are dated Oct. 1, 1922, and are due Oct. 1, 1947. The purpose of this issue is to provide for refunding of underlying bonds and for partially reimbursing the company for property expenditures, heretofore unfunded, including a new 10,000-hp. steam turbine-generating unit, recently installed to supply the constantly increasing demand for electric energy.

\$3,250,000 Winnipeg Issue Offered.— A new issue of \$3,250,000 Winnipeg (Man.) Electric Railway twenty-year general mortgage and collateral trust 6 per cent gold bonds, dated March 1, 1923, and due March 1, 1943, is offered at 94 and interest to yield over 61 per cent. According to the announcement \$815,000 of the total issue is to be offered in Canada, and Kissel, Kinnicutt & Company, E. H. Rollins & Sons and Spencer Trask & Company are offering the remainder in New York. The bankers say the company's total debt, including this issue, will be \$12,630,000 against a net property value of \$23,187,-915, after deducting depreciation of \$4,153,508.

Demand Receiver Be Appointed. -Four former stockholders in the Universal Elevated Railways, Seattle, Wash., have filed suit in the Superior Court against R. G. Howe, former president and manager of the concern, demanding an accounting and the appointment of a receiver. The complaint recites that the company was incorporated in May, 1917, for \$2,500,000 capitalization, to build a monorail elevated railway. In January 1921, the company was disincorporated and its assets were turned over to Mr. Howe. The plaintiffs assert that these assets have been mismanaged and that for a time Howe went to California, taking assets and books with him. He has returned, and the plaintiffs ask an order preventing him from making a similar trip and for appointment of a receiver and an accounting.

Luce Line Increase Authorized .- The Interstate Commerce Commission has authorized the Electric Short Line Railway, an Arizona corporation with an authorized capitalization of \$100,000,-000, equally divided into common and preferred stock, and owning an electric railroad in Minnesota, to issue not more than \$367,000 of 5 per cent fifteenyear first mortgage bonds and to deliver \$342,000 of them to W. L. Luce, J. E. Luce, E. D. Luce and Hazel B. Luce in payment for advances made by them to the company, and not more than \$25,000 to be delivered to E. D. Luce for advances to be made to the company by him hereafter. The company bought the railroad from the Phoenix Company, controlled by the Luce family, in 1908, but made no cash payment for The railroad has been extended westward from Minneapolis about 30 miles. The Luce family has been furnishing money for the construction, which was delayed by the war. The bonds are to be dated Sept. 15, 1916.

Traffic and Transportation

Boston "L" on Jitneys

Public Trustees Clearly Define Their Attitude on Subject of Competitive Service

The Boston (Mass.) Elevated Railway has adopted a settled policy toward the jitney proposition. It will resort to drastic measures, if necessary, to carry that policy into effect in the city of Malden. For a considerable period it has been a much disputed question whether the residents of one section of Malden should have both jitney service and electric car service over the same route. The city government granted a jitney license to Mr. Hart to operate cars through Salem Street, despite the warnings from the Boston Elevated that it could not submit to competition. The Elevated compromised the situation at first and withdrew its non-paying service from Lebanon Street and Broadway, which lie beyond the Salem Street route and serve as feeders to it, but continued to operate its cars through Salem Street and pick up such small amount of traffic as the jitneys left, the jitneys taking the cream of the business. The company continued this competitive service, though it did not pay, on the assurance that the jitney license would not be renewed by the city government this year.

UP TO THE COMMUNITY TO DECIDE

There had been a strenuous political campaign in the city, in which the jitney and the Boston Elevated became the main issue. There was a distinct set of Jitney candidates for the City Council, pledged to the idea that the fitney service should be protected, and this set of candidates carried the election, with the result that when the new City Council met it promptly voted to renew the jitney licenses, and at the same time to give the Boston Elevated Rallway a jitney license, so that it too could operate buses. Up to that time the Boston Elevated had not explicitly indicated its determination to discontinue its service entirely on the East side of Malden Square.

The board of trustees has, however, decided that it cannot accept any form of competition from the jitneya and that it will not attempt to dietate to a community what form of transportation it shall have, but that if the community chooses to select the jitney the company will withdraw from the field and not attempt to divide the traffic with the jitney.

In discussing this situation with the representative of the ELECTRIC RAIL-way JOURNAL at Boston Edward Dana, general manager of the Boston Elevated Railway, said that in view of all the circumstances the trustees have no other course open to them than to quit, because they are responsible under the

public control act for the financial condition of the road and are not warranted in continuing any branch of the service that does not pay for itself. They are required to operate the system so that the receipts shall cover the cost of service, and the system as a whole shall not be burdened with deadweight branches that unduly impair the finances of the company. They have been operating on the east side of Malden at a loss, partly because Lebanon Street and Broadway do not serve many passengers, and more particularly because the jitneys have taken away paying business in Salem Street.

FORMAL STATEMENT TO MAYOR

The position of the public trustees is stated in the following communication sent to Mayor Kimball of Malden to warn him of the consequences if he signs the jitney order which has been passed by the City Council:

As stated in my last letter the trustees of the Boston Elevated Railway must decline to enter into any competition with jitney lines which will involve a loss of revenue that imposes an unjust burden upon other users of the railway. To take any other position would be to disregard the fundamental principle of the service at cost contemplated in the statute under which they act. It has been repeatedly expialned that this does not mean that the trustees assume to interfere with the preference of a community as to the kind of iransportation it desires.

In this instance the receot action of the

In this instance the recent action of the City Council of Malden in approving a competitive line of liturys on Salem Street east of Malden Square, has exercised this right of choice

of Malden Square, has exercised this right of choice. While regretting the necessity of withdrawing street railway accommodation, the trustees feel competied to enforce the rule which they have established. Therefore, in view of the loss that would result from the proposed competition and subsequent burden upon the system as a whole, rullway service will be discontinued on Salem Street east of Malden Square when this competition occurs.

This question of jitney competition with the Boston Elevated has been brought up before in many of the communities which the railway is serving, but those communities have taken a different view of it from the residents of Malden. In Boston, for instance, the city government granted a license for the operation of a jitney line at the Orient Heights, in direct competition with the Boston Elevated, but when the order came before Mayor James M. Curley he promptly vetoed it, with the assertion that it would be an uneconomic arrangement and that the street railway service was the more reliable. The Boston Elevated has, however, obtained a license to operate huses in Boston as feeders, and its plan is to install buses in various sections as the requirements of traffic call for it, and it plans to install buses on branch lines when the old tracks wear out and the traffic does not warrant the expenditures involved in putting down new tracks.

Cambridge, Medford, Somerville and Everett have had occasion to take action on the jitney proposition and in all instances have favored the Boston Elevated as against the jitneys. Some of them have asked the Boston Elevated to install bus service in certain sections and the company has taken their propositions under consideration.

It is to be understood, however, that the Boston Elevated enters no opposition to jitney service in any community where the jitneys do not operate over the same route as the street cars or do not enter into competition with them.

Plea Upheld

Supreme Court Agrees With Paducah Company That City Cannot Arbitrarily Fix Fare at Five Cents

The contention of the Paducah (Ky.) Railway that the city of Paducah could not arbitrarily declare by ordinance a 5-cent fare and that the franchise contained no such right was upheld by a decision of the United States Supreme Court Feb. 19, affirming the decision of the United States District Court for the Western district of Kentucky. The decree of the lower court, however, was modified so as to protect the city's rights in the event conditions change in the future.

The company was granted a franchise for twenty years in April, 1919. The franchise contained a clause that the fare should be 5 cents, and half fare for children between the ages of five and twelve, for a period of twelve months; that the company was to report its financial conditions and that if it could not make operating expenses plus a reasonable return (8 per cent) on its investment, this fact should be shown, and if it made more than operating expenses plus reasonable return there should be payment to the city.

The company reported in September, 1920, that its income for the year was \$4,800 less than expenses and that to include reasonable return on its investment there would be a shortage of \$72,350. It figured that a fare of 13½ cents would be necessary to make up this amount, but offered to declare a cash fare of 10 cents, tokens 7.5 cents and children's fare, 5 cents. The city passed an ordinance declaring the old fare legal, with provision for a heavy fine for violation by requiring a higher fare.

Appeal was made by the company for an injunction, and a temporary order was issued. On the trial of the case on its merits, the city did not make serious effort to prove that the financial facts were not as stated by the corporation, but contended that the franchise constituted a contract for the 5-cent fare. The lower court held, and the Supreme Court agrees, that the clause for 5-cent fare for a year, annual reports and payment of excess to the city plainly meant that fares were subject to adjustment. The modification in the decree was directed by the Supreme Court in order that if, in the future, operating costs are reduced, or income grows, a readjustment downward of the fares in Paducah might be made.

Milwaukee Asks Injunction Against One-Man Cars

An application has been filed by the city of Milwaukee for an injunction to restrain the Milwaukee Northern Railway, operating a city line in Milwaukee. from placing one-man cars in operation on this line. The case is before the Dane County Circuit Court,

The city contends that the recent order of the Wisconsin Railroad Commission, authorizing the company to operate one-man cars in the city, should be vacated because it nullifies a city ordinance passed in 1914 requiring a two-man crew on every street car operated in the city.

One-man cars are already being operated in Milwaukee by the Milwaukee Electric Railway & Light Company. The Wisconsin Railroad Commission recently permitted the Milwaukee Northern and the Chicago, North Shore & Milwaukee Railroad to operate one-man cars on their city lines in Milwaukee. The case will therefore be in the nature of a test case which will probably determine whether one-man operation will be permitted in the city.

Fare Argument Scheduled

Appeals of the Georgia Railway & Power Company, Atlanta, Ga., and others challenging the constitutionality of the law under which the Railroad Commission of Georgia fixed fares at Decatur and College Park, were recently advanced by the Supreme Court for argument on April 16.

· This case dates back to four years ago, when the cities of Decatur and College Park contested the right of the power company to increase fares from 5 to 7 cents, claiming that they held contracts with the power company guaranteeing them perpetual 5-cent fare service in return for franchise rights. The various steps in this fare issue have been referred to previously in these columns.

Weekly Pass Has Grown in Popularity in Terre Haute

When the weekly pass was introduced in Terre Haute, thirty-eight weeks ago, said the Terre Haute Tribune recently, it was an entirely new venture in passenger transportation, but it has met with such favor from all sides that it has established itself as a permanency in the local system of the Terre Haute Traction & Light Company. Patrons, officials and employees of the railway have voiced their approval of the weekly pass because of its economical advantages, elimination of labor and confusion in making change and transfer.

Since the pass was adopted by the Terre Haute company several other transportation systems throughout the country have adopted a similar method, but there are very few cities where the pass has been introduced against a 5-cent fare. The majority of cities which are using the pass have a regular fare which is several cents higher than the local rate and there are only a very few cities which maintain the 5-cent fare. The paper then quotes E. M. Walker, general manager of the company, as follows:

company, as follows:

We are very well satisfied with the pass, but probably not more so than the patrons of the traction system. The pass reaches the person who has to ride frequently, and it offers a much cheaper ride. The pass has met with such favor that I do not believe that it could be dispensed with, as it is becoming an essential part of the service. It has proved a very good thing.

Operators of the cars like the pass, as it acquaints them with their regular passengers by getting them into close touch as merchants and customers. The pass eliminates delays in making change, transfers and in loading passengers. It also offers adding passengers. It also offers adding passengers and in loading passengers. It also offers adding passengers and in loading passengers. It also offers adding passengers and in loading passengers. It also offers adding passengers and in loading passengers. It also offers adding the pass of the pass, although the house-wives have realized its value in shopping and making social calls. The pass follows the laws of economy very closely, for we find that only the people who make daily use of the cars purchase the passes.

Something New in Passes

The City Council of Seattle, Wash., has received an unusual proposition from I. T. Cross, a Civil War veteran more than eighty years old, who asks that the Municipal Railway carry him at his pleasure for one year, upon his payment of \$40, "cash in advance." The city would not be bound to make a rebate in case he moves away, becomes ill or dies in the meantime, he makes plain in his letter. He states that he has no business that would require even \$5 in earfare a year, but "being so lonesome from my poor hearing, and to pass away the time more comfortably and pleasantly, I would like to pay \$40 in advance for a yearly pass, and would waive all damages for any accident that might come to me while riding." The Council has taken the matter under consideration.

Seeks Bus Franchise

The New York State Railways has petitioned for a franchise to operate a bus line in Greece Township from the present Dewey Avenue line terminus at Lewiston Avenue beyond the Rochester city line to Stone Road, a distance of approximately 2 miles.

The city had granted a franchise to the company to extend its Dewey Avenue line to the city limits and the company planned the installation of trackless trolleys. The poles, ordered some time ago, did not arrive, and it was decided to resort to bus operation.

Commissioner Barnes stated that the buses would be in service within sixty days after a franchise had been granted by the Town Board of Greece.

James F. Hamilton, president of the New York State Railways, said that his company was taking the step essentially for the development of a rapidly growing section of Rochester.

Forbids Operation Along Traction Line.—An ordinance introduced in the City Council of Marion, Ohio, forbids motor buses operating along the lines of the Columbus, Delaware & Marion Railway. They are also prohibited from crossing railroad tracks until the driver gets out to look for a train.

Seeks Reduced Fare Schedule.-The Ogdensburg (N. Y.) Street Railway has made application to the Public Service Commission for permission to adopt a reduced fare schedule for school chil-

Asks for Buses for Emergency .--Mayor Clarence A. Whitmyre of Schenectady, N. Y., has asked for emergency buses to aid in handling passenger traffic on the lines of the Schenectady Railway.

Offers Bus Service.—The Tacoma Railway & Power Company, Tacoma, Wash., will operate buses from the City Hall to the flour mills on the waterfront, in lieu of re-establishing railway service on Pacific Avenue north of Seventh Street.

Add Buses to Northeast. - The City Council of Des Moines, Ia., has approved the petition of the Four Mile Improvement League which provides for bus service by the Des Moines City Railway in the Northeast section of the city. Manager Chambers of the railway company stated that nothing definite would be done until the fund status could be ascertained.

Request Fare Adjustment.—The Glendale & Montrose Railway, operating between Glendale. Montrose and La Crenscentia, also between Glendale and Eagle Rock, has applied to the California State Railroad Commission for an adjustment of its passenger rates, claimin that the return on the present rate of fare on its lines is insufficient to cover its cost of operation.

No Boost in Income.-The Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., recently lowered its fares from 10 cents to 7 cents in the hope that new business would result and so solve the operating cost problem. C. D. Cass, general manager of the property, in a recent letter to the Mayor and Councilmen, stated that the gross revenue from 7-cent fares had decreased more than 19 per cent compared with January a year ago and decreased 24 per cent compared with December, the last month of the 10-cent fare.

Starts Service on New Extension .-The Taraval Street extension of the San Francisco (Calif.) Municipal Railway was formerly opened for traffic on Jan. 14, with Mayor James Rolph, Jr., acting as conductor on the first car over the line. A branch line was built some two years ago from the west portal of Twin Peaks tunnel to Taraval Street and Thirty-third Avenue. The extension just put in service is seven-eighths of a mile long and is an extension of the line just mentioned along Taraval Street to Forty-ninth Avenue, which is close to the ocean beach. Headway on the new line will be about eight minutes. the cars operating in shuttle service from the tunnel portal to the beach. On Sundays and holidays through cars will be operated from the ferry via this branch to the ocean beach terminal.

Personal Items

New Head for Transportation Department

The Chamber of Commerce of the United States has announced the appointment of A. B. Barber, Portland, Ore., as manager of the chamber's Department of Transportation and Communication. He succeeds J. Rowland Bibbins, who has resigned to take up private engineering practice.

For the past three years Mr. Barber served as technical adviser to the Republic of Poland, having been nominated for that work in 1919 by Secretary Hoover, on request of the Polish government to designate an American engineer to assist in the organization of the railways, coal industry and other technical services.

Mr. Barber is a graduate of West Point. Prior to his resignation from the army three years ago to become head of the American technical staff for Poland, he had wide experience with the United States Army engineers. Soon after the entry of the United States into the war he was sent to France with a railway commission to report on the needs of the French railways supplying the Allied troops. Later he was as-aigned to General Pershing's staff. From June to November, 1918, he was at the front with the First Corps and First and Second Armies. After the armistice, he was assigned to the Amer-ican Relief Administration, handling the transportation of relief supplies to the various countries of Central Europe.

The department of which Mr. Barber is head handles the activities of the United States Chamber of Commerce in connection with shipping, ocean and inland; steam and electric railroads, motor transportation; aeronautics; and communication by cable, telegraph, post and radio.

E. F. Chaffee Elected Vice-President of Edwards Company

Edward F. Chaffee has been elected a vice-president of the O. M. Edwards Company, Inc., Syracuse, N. Y. Mr. Chaffee has been manager of the company's railroad department for the past twelve years. The new vice-president has been identified with railroad and allied industries since a boy. Eighteen years ago he went with the Edwards Company from the New York Central Railroad, where he had charge of the passenger car shops at West Albany. His first work for the Edwards Company was in the capacity of eastern sales representative, a position which he held for six years. He then was promoted to manager of the railroad department. Under his supervision the department which manufactures car window fixtures and metal extension platform trapdoors for steam and electric cars has enjoyed a substantial growth.

At the recent annual meeting of the Edwards Company, O. M. Edwards, president, voiced considerable optimism over the business prospects during the present year, not only for the company's railroad department, but for the steel metal furniture and padlock departments.

E. H. Thomas Director

Former Managing Editor to Direct Work of Washington Committee on Public Utility Information

E. H. Thomas, who has been placed in charge of the Washington Committee on Public Utility Information as direc-



E. H. Thomas

tor, with offices in the Henry Building, Seattle, Wash., Is a newspaper man of very broad experience. He is known in Seattle and elsewhere in the Pacific Northwest as plain Ed Thomas. The committee of which he is the director is organized along the lines of similar committees in other states. It represents the electric railways, electric light and power companies and, to a great extent, the gas Industry of the State.

Mr. Thomas' experience in newspaper work covered a period of twenty-seven years. He was formerly managing editor of the Seattle Post-Intelligencer. In addition to that he had eight years experience in public utility publicity work, being formerly publicity director for the Puget Sound Power & Light Company.

As Mr. Thomas sees it, the committee of which he is the director exists to furnish accurate information and facts about the public utility business to any citizen or group of citizens. The bureau will send out each week to the newspapers information about various phases of the public utility industry in the belief that the business, touching as it does so very intimately the domestic, social, commercial and industrial life

of the people, is a matter of concern to the public.

Mr. Thomas has already reduced to concrete figures some of the outstanding facts in regard to the workings of the utility industry in Washington. The aggregate assessed valuation of the properties subscribing to the Washington committee is in excess of \$45,000,000. but, unlike other kinds of business, the gross revenues of the companies are only a fraction of that figure, being \$19,540,000 annually, or less than 40 per cent of \$45,000,000. The utilities in Washington pay more than \$1,600,000 annually in taxes, have 4,359 persons on their \$6,129,000 annual payroll and serve a total of more than 146,000 light and power customers.

The long experience which Mr. Thomas had as an active newspaper man has taught him the things in which the public is interested, and his previous association with public utility work has furnished him with a fund of information as to the sources contained within the utilities themselves for obtaining material that has a popular appeal and at the same time is founded on facts.

Changes Made in Western Light Personnel

Paul W. Lee has succeeded W. J. Barker as second vice-president of the Western Light & Power Company, Boulder, Col. E. E. Sherman, formerly the auditor, has now assumed the position of assistant secretary along with the auditorship. D. W. Guiney has taken on the work of assistant treasurer as well as performing his duties as purchasing agent. C. L. Green's official title has been changed from superintendent of street railway to railway superintendent. C. W. Vandiver will now be known as railway engineer instead of chief engineer. title of electrical engineer has been changed to that of superintendent of electrical equipment and John D. Elftman, formerly known as engineer of power station, has become superintendent of production.

Tom Owens Promoted

Tom Owens, who has been in charge of the schedule department of the Dallas (Tex.) Railway, under supervision of George I. Plummer, superintendent of transportation, has been promoted to be in charge of the employment and training department. Mr. Owens is a veteran employee of the Dallas Railway. He worked up from the ranks. He succeeds M. B. Parsons, who has been appointed superintendent of maintenance and operation of the Texas Interurban Railway, and will also have charge of the maintenance and operation of the Dallas-Denton Interurban.

Mr. Porter on Engineering Body

H. Hobart Porter, president of the American Waterworks & Electric Company and vice-president of the Brooklyn City Railroad, has been appointed a member of a committee recently created by the Engineering Foundation to

co-operate in a nationwide study of arch dams. Silas H. Woodward, New York, is another member of the committee, which is made up largely of representatives of Western cities and the United States Reclamation Service. The Engineering Foundation, of which

Charles F. Rand, mining engineer of New York, is chairman, will investigate the question of arch dams in all its phases of construction, design and relation to industrial and municipal problems, particularly water supply. A large investment is involved in these problems.

Mr. Mitten Resigns as President

Head of Philadelphia Rapid Transit Retires in Favor of W. C. Dunbar, but Continues as Chairman of the Board-New President Has Been Associated with Mitten Activities Since 1908

THOMAS E. Mitten resigned on Feb. 19 as president of the Philadelphia Rapid Transit Company. W. C. Dunbar, an official of the company since 1911 and recently financial vice-president, was elected to serve as Mr. Mitten's successor.

Mr. Mitten will not sever his connection with the company, but will retain the chairmanship of the board of directors and executive committee. In

T. E. Mitten

that capacity, he will assume personal charge of all negotiations between the company and the city looking to company operation of the city-built highspeed lines.

The retirement of Mr. Mitten has been contemplated for some time. On several occasions, in public speeches, he has announced that he intended to withdraw from active management, leaving that to the young officials whom he was training while he remained in the background and advised his successors on questions of policy.

At the tenth anniversary banquet of the Co-operative Committees in the Hotel Lorraine on March 2, 1921, Mr. Mitten said that he had developed an organization which was self-perpetuating, and that the working out of the plan which the Mitten interests had in mind went beyond one man's lifetime. Mr. Mitten then said that he expected to die in harness, but that he was sure the work would go on without him when his time came. It was then that he first explained publicly the plan of organization of Mitten Management, Inc., with Messrs. Tulley, Dunbar, Joyce and P. J. Mitten as vice-presidents, each an expert in his own particular line of work.

Mr. Mitten believes now that his personally trained assistants are able to take charge of the road and operate it efficiently, thus demonstrating that the policies of Mitten men and management will endure even after his tenure of life. He said so in the official announcement of his withdrawal as president of the company. His statement to the stockholders in that connection reads:

reads:

Mitten men and management, appreciative of stockholders' support, now propose to prove the strength of P. R. T. organization, fully manned, thus showing P. R. T. capable of continued prosperity under cooperative management, independent of Mitten's remaining tenure of life.

T. E. Mitten will continue as chairman of the board of directors, chairman of the executive committee, and will counsel the entire organization, directing his greatest personal effort to reach a city-company understanding, by which city-built subways may be made possible of operation.

C. J. Joyce, legal adviser since 1918, will become vice-chairman of the Board and counselor, with Ellis Ames Ballard as general counsel.

Vice-President W. C. Dunhar, directing

and counselor, with Ellis Ames Ballard as general counsel.

Vice-President W. C. Dunbar, directing P. R. T. finances since 1911, connected with Mitten activities since 1908, is responsible for the first-class banking connection and A-1 credit established during 1922. Mr. Dunbar will become the new P. R. T. president, which appointment is particularly fitting at this time, as P. R. T.'s principal problems now lie in the direction of such readjustment of its financial structure as will best fit it to undertake the operation of city-built lines.

Vice-President R. T. Senter, formerly shop superintendent and engineer, with Mitten activities since 1901, will continue in charge of all engineering; with J. H. M. Andrews, P. R. T. engineer since 1903, as chief engineer in charge of construction and maintenance, all departments.

Traffic Manager Leon Jewell, in charge of traffic since 1911 and in similar capacity with Mitten activities since 1905, will become vice-president, in charge of traffic, with G. P. Good, superintendent of transportation with P. R. T. since 1895, in direct charge of transportation matters, including the operation of the cars on the streets.

W. K. Myers, actively engaged in valua-

streets.

W. K. Myers, actively engaged in valuation of P. R. T. since 1918 and later assistant to Mr. Dunbar, will succeed as vice-president in charge of finance and accounting, thus continuing his valued

A. A. Mitten, "the chief's understudy in industrial relations," will continue as secretary of the Co-operative Welfare Association, thus assuring the continuance of all co-operative undertakings.

Officers in subordinate capacity are in training as successors to all these positions. Their places will in turn be filled by advancement from the most efficient of the 10,000 employee-owners who continually and increasingly press upon the heels of their leaders.

Mr. Mitten!

Mr. Mitten's resignation as president and the appointment of Mr. Dunbar to succeed him have been formally ratified by the board of directors, composed almost entirely of the men who will now assume the active charge of the road under the leadership of Mr. Dunbar.

Mr. Dunbar has been associated with Mitten activities since 1908, when he

became comptroller of the International Railway, Buffalo, N. Y., of which company T. E. Mitten was then chairman of the executive committee. Mr. Dunbar went to Philadelphia at the incoming of Mitten Management in 1911, in charge of P. R. T. accounting department, later becoming comptroller. In 1919 he was elected vice-president of the company in charge of finance and accounting.

When the stockholders returned Mr. Mitten following Mr. Stotesbury's withdrawal from the board, they expressed not only their confidence in Mr. Mitten as an operator, but evidenced their faith that he would rehabilitate the company's financing and banking just as he had rebuilt the operating organization. That job he turned over to Mr. Dunbar, who is directly responsible for the first-class banking connection and A-1 credit established by the company during 1922.

Mr. Dunbar was born in Michigan in



W. C. Dunbar

He received his public schooling and high school education in Bloomfield, N. J. His first job was in the auditor's office of the New York Central Railroad. This he left in 1901 to become assistant auditor of a coal company. He received the degree of C. P. A. in New York State in 1904 and for the next three or four years was engaged with Marwick, Mitchell & Company, chartered accountants, the last year of which he was in charge of the Kansas City office, which position he left to become comptroller under Mr. Mitten at Buffalo.

J. S. Bleecker Heads Terminal Company

John S. Bleecker was elected president of the Columbus Interurban Terminal Company, at the annual election in Columbus, Ohio, on Feb. 14. company owns the terminal building, which is used by three traction lines. Other officers elected are: A. F. Van Deinse, vice-president; F. A. Healy, secretary-treasurer, and J. M. Pogue, assistant secretary and treasurer.

Messrs. Bleecker, Healy and Pogue are executives of the Indiana, Columbus & Eastern Traction Company, with headquarters in Springfield. The terminal company is owned jointly by the I. C. & E., Columbus, Newark & Zanesville, and Columbus, Dayton & Mansfield traction companies.

These directors were elected at the annual meeting of the stockholders on the same day: John S. Bleecker, F. A. dealy, F. G. Clunis, A. F. Van Deinse, M. P. Maloney and W. Finley Downs,

John A. Miller, Jr., has joined the New York editorial staff of ELECTRIC RAILWAY JOURNAL. Mr. Miller comes to the paper after several years experience in various departments of the Public Service Railway of New Jersey. After he was graduated in civil engineering from the Sheffield Scientific School, Yale University, 1915, Mr. Miller began a "cadet engineer" course with the Public Service Railway. Following out the progression in this course, he was employed in the maintenance-of-way department, the Marion and Essex power plants, the distribution department, the mechanical department at the Plank Road and Roseville shops, in the time-table department and in the traffic department. He served for a time as assistant supervisor at the Montclair carhouse, was temporarily in charge of the trainmen's school of instruction at Hoboken, and also served as special instructor for safety cars in Paterson.

Mr. Miller is a native of New Jersey. He was born in Newark, on Sept. 20, 1895, and received his early education at the Newark Academy. He served with the First New Jersey Cavalry on the Mexican border in 1916, and during the World War with the 104th Engineers in France as second and first lieutenant. Mr. Miller comes to the ELECTRIC RAILWAY JOURNAL with a well-rounded knowledge of the various departments of street and interurhan railway operation and the inter-relations of the various departments as well as experience in the policies and problems of an electric railway.

E. G. Stevenson, acting president of the Detroit (Mich.) United Railway, has been made president.

J. C. Price, formerly superintendent of overhead construction of the Lafayette (Ind.) Street Railway, has been succeeded by Curtis Lewis.

J. W. McConnell has resigned as director and vice-president of the Montreal (Que.) Tramways. Mr. McConnell has been associated with the company from its commencement.

Charles E. Whelan, superintendent of the Lowell division of the Eastern Massachusetts Street Railway, Boston, Mass., has tendered his resignation to take effect on Feb. I, after twenty-three years of railroad experience. Mr. Whelan began his career as a railway worker in 1900, when he was only twenty-one years old. He came to Lowell from the Boston office on July 6, 1921, to fill the position of superintendent. Mr. Whelan has not announced his plans for the future.

Mr. Uffert on the Job

Unprecedented Snows in New York State Throw Great Burden on Railway Equipment

John F. Uffert, superintendent of equipment of the New York State Railways, has been having more than his share of troubles recently. It is a big job at any time looking after all the equipment of the system of that company in Rochester, Syracuse, Utica, Schenectady and other cities, but this winter the work has been unusually trying.

There have been unprecedented snows up-State and the storms seem to have spent their greatest fury on Schenectady. In consequence more than forty cars, or about one-fourth of the



John F. Liffert on the Joh

total, were put out of service there at one time. This was too much for the local force, and an S. O. S. was sent out to General Manager Hamilton at Rochester for help. He and Mr. Uffert hastened to Schenectady, there to remain until a semblance of order had been restored.

Hard work is nothing new to "Jack" Uffert. He just donned his overalls and went to it. A newspaper man nosing around for copy found John on the job, and much against the wishes of Mr. Uffert insisted upon telling the people of Schenectady that not a stone was being left unturned to restore service to normal and then "shot" Mr. Uffert in overalls to prove that the story he wrote was based on fact. Under Mr. Uffert's direction at Schenectady was an expert force of shopmen recruited by him from the other cities in which the New York State Railways operate.

"Jack" Uffert needs no introduction to electric railway men in New York State and east of the Appalachians. To the men in the Sunny South and on the balmy Pacific Coast, however, the story is of interest of this man who donned his overalls again and went to work out in the open with the mercury in the thermometer down around zero.

Mr. Uffert was born in Newark, N. J., in 1880. At thirteen years of age he went to work for the Consolidated Traction Company of New Jersey, the lines of which are now included in the system of the Public Service Railway. This was at the time of the installation of electricity as motive power. Mr. Uffert eaught on quickly, as the saying goes. The man was rare in those days who knew much about the workings of railway motors under service conditions, but in four years Mr. Uffert learned a whole lot. result was that at the age of seventeen he became shop foreman for the Union Railway, New York. Since then his work with one exception has all been with roads in the East, among them the United Traction Company, Albany, and the Hudson Valley Railway. On the occasion that Mr. Uffert did venture West he was with the Portland Railway, Light & Power Company on its eity and interurban lines in Oregon for a short time.

Obituary

W. M. Weatherwax

William M. Weatherwax, formerly in charge of the transportation department of the Chicago City Railway and later superintendent of transportation of the Chicago Surface Lines, died at his home in the town of Schaghticoke, near Troy, N. Y., on Feb. 16. He was fifty-six years old. Mr. Weatherwax was one of the aides of Thomas E. Mitten, chairman of the board of the Philadelphia and Buffalo traction lines. He was in Buffalo during the strike of the platform employees on the lines of the International as official representative of Mr. Mitten.

Mr. Weatherwax began street railway work as a conductor on the Troy & Lansingburgh Street Railway, Troy, N. Y., in 1884. His first work in the West was with the Northern Transportation Company, where he advanced successively from watchman to lookout and finally to wheelsman. In 1866 he entered the service of the Chicago City Railway as a driver of tow horses. He was soon thereafter transferred to general carhouse service. He was next made a conductor, in which position he remained until April, 1890, when he was advanced to assistant foreman in charge of cars and trainmen at one of the carhouses. In April, 1893, he was made a carhouse foreman, and later was transferred to what is now known as the Englewood carhouse with the same title until the position was redesignated division superintendent. From this he was promoted to superintendent of transportation of the Chicago City Railway and then the Chicago Surface Lines,

Manufactures and the Markets

News of and for Manufacturers-Market and Trade Conditions A Department Open to Railways and Manufacturers for Discussion of Manufacturing and Sales Matters

European Situation Improving

General Tripp Tells Westinghouse Veterans at Tenth Annual Banquet that Business Outlook is Good

Prosperity in the United States depends largely on the re-establishment of the purchasing power of Europe. Gen. Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, told guests at the tenth annual banquet of the Westinghouse Veterans' Association in Pittsburgh recently. General Tripp said, in part:

of the Westinghouse Veterans' Association in Pittsburgh recently. General Tripp said, in part:

I am one of the apparently very few who think that the administration in Wastington is better equipped to decide what part we ought to take than the vast majority of private citizens can be, and I have no doubt that the President and his Cabinet are fully alive to the bearing of the Rhhr occupation upon our immediate prosperity. If a man cannot be an optimist in the United States he must get off the planet to find a place to suit him, because there is no better place on this one. The greatest single question involved in our industrial problem is how much! do European conditions affect this country? If what happens in Europe doesn't matter to America, then I would take the risk of saying that we are going to have a period of great activity and prosperity. If, on the other hand, what happens in Europe does greatly affect America, then no man can safely predict the immediate future.

The American farmer cannot sell his product even at cost because of overproduction due to the decrease of purchasing power in Europe. When you think of the large percentage of products of the soil which was formerly sold abroad, amounting to as high as 56 and 60 per cent in the case of cotton, and when you consider that this market is almost closed, and the remember that the agricultural industry supports more than one-third of our population, you have the picture in the outfook. If, then, we agree that American industry cannot long be prosperous with the business of one-third of the population prostrate, it follows that the continuance of a high degree of prosperity here depends largely upon the re-establishment of the purchasing power of Europe.

The demand is there, and, notwinstanding the loss of population auring the war, their needs are greater than ever and buying would industry while he population prostrate, it follows that the continuance of a high degree of prosperity here depends largely upon the re-establishment of the purchasin

other favorable indications that Europe is other favorable indications that Europe is progressing toward the light. But most of these processes must be slow and 1923 has but fifty-two weeks in it. It is the immediate future which is in douht, and I think the one outstanding thing which will give immediate relief is that France shall be successful in forcing an early settlement of the reparations question in order that international credits may be established and confidence restored. In fact, it is probable that our prosperity for 1923, particularly the latter part of it, depends to a considerable extent upon this issue.

Meeting Called to Consider Car Leasing

Seattle car builders who are interested in supplying the Seattle (Wash.) Municipal Railway with 200 street cars have been invited by the utilities committee of the City Council to appear at a hearing to consider the leasing of the cars to the city for a period of five to ten years. The bill introduced in Council authorizes the Board of Public Works to call for bids for the leasing of from 100 to 200 new cars, to weigh about half as much as the cars now in use. The cars are not to be purchased, but leased to the city with the option of purchase for \$1,000 each at the end of ten years, \$2,000 in seven years, and \$3,000 in five years. A state law prohibits direct purchases. The only question concerning the ability of Seattle builders to compete is the proper financing, committee members state.

Research Group Holds Meeting

The Electric Steel Founders' Research Group held one of its regular meetings in Detroit, on Feb. 5 and 6. The group is composed of the Electric Steel Company (of Chicago), Fort Pitt Steel Casting Company, Lebanon Steel Foundry, Michigan Steel Casting Company, and Sivyer Steel Casting Company. Officers and operating officials of each of these steel foundries discussed the reports which were presented at this meeting, on investigations being carried on at the different plants. The more important ones in progress now are said to be those on electric furnace practice, core practice and facing practice. The group decided to expand the scope of its work and to provide for greater activity on the part of its committee on new uses for steel castings. For this purpose W. J. Corbett was engaged as industrial engineer to be associated with R. A. Bull, research director, in the increased activities of the group in its comprehensive research work. Mr. Corbett's engineering training was supplemented by several years of experience in plants of the American Steel Foundries, also in the steel foundries of the Watertown Arsenal and the Erie Forge Company. Mr. Corbett's headquarters will be at the group's eentral office, 639 Diversey Parkway, Chicago.

Securities Company Organized

A new plan has been announced for the promotion of thrift among the employees of the General Electric Company. This is in addition to the present plan under which the employees may become holders of the stock of that company. To further the new plan the General Electric Employees' Securities Corporation has been organized.

The new corporation will issue 6 per cent bonds to employees, on the installment plan, paying an additional 2 per cent on them as long as the holder remains in the employ of the company. Seven of the fifteen members of the board of directors will be representatives of the employees, elected by the bondholders. Each \$10 par value of such bonds of the new corporation will have one vote for these directors. Eight directors will be named by the company. new corporation will \$5,000,000 of 6 per cent fifty-year bonds and 10,000 shares of no-par-value capital stock. The proceeds from the sale of the stock and the bonds will be invested by the company in the securities of light and power companies and of holding companies in which the General Electric Company itself is financially interested. In other words, the idea of the investment trust will be followed, with the employees as participators in the profits through their holdings of the securities of the trust itself.

Long Island Places Order

Because of a large increase in traffic. the Long Island Railroad, which handles probably the heaviest suburban traffic in the world, has just purchased from the Westinghouse Electric & Manufacturing Company forty motor car equipments, twenty trail car equipments and four baggage mail car equipments. The baggage cars will be equipped with type 308 D-7 field control motors and electric-pneumatic control.

To take care of the increase in power demand when this new equipment is put into service it has been necessary to increase the substation capacity of the railroad, and an order has been placed, also with the same company, for one 4,000-kw. and one 3,000-kw., six-phase, 25-cycle, 650-volt converter with the necessary transformers. The entire order amounts to more than \$500,000.

Metal, Coal and Material Prices

Metala—New York F Copper, electrolytic, eents per lb. Copper wire base, eents per lb. Lead, cents per lb. Zive, eents per lb. Tin, Straits, cents per lb.	eb. 20 1923 16.00 18.125 8.10 7.60 42.625
Bitumineus Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tona	\$6.70 4.125 2.75 2.55 1.625 2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft. Weatherproof wire base, N.Y., cents per lb. Cement, Chicago net prices, without bags. Linseed oil (5-bbl.lots), N.Y., cents per gal. White lead, (100-lb.keg), N.Y., cents per lb. Turpentioe, (bbl. lots), N.Y., per gal.	7,30 17,50 \$2,20 99,00 13,125 \$1,50

Rolling Stock

Citizens Traction Company, Oil City, Pa,, has ordered six new cars for use in Franklin and Oil City. They will be of a type similar to the Birney one-man cars now in service.

Interstate Public Service Company, Indianapolis, Ind., will place contracts in a few days for the buffet and parlor cars to be operated from Indianapolis, Jeffersonville and Louisville and referred to previously in these columns. These cars, it is said, will mark a new standard of comfort on the interurban road.

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., will replace immediately the eight cars recently destroyed in the carhouse fire in South Bend by five motor cars and two trailers which have arrived from Cleveland, Ohio. From this city they were piloted under their own power over the various interurban lines which connect South Bend with the East.

New York & Long Island Traction Company, Long Island City, N. Y., suffered the loss by fire of a car shed in Hempstead, L. I., on Feb. 18. Three service cars and eleven enclosed passenger cars were destroyed. Five of the cars were leased from the Brooklyn Rapid Transit Company and one from the Bridge Operating Company. The company is now conferring with the Long Island Railroad on plans to provide adequate service along this route in future. Until these plans are completed, no decision will be made by the company as to replacing the equipment or rebuilding the carhouse.

Louisville (Ky.) Railway has orders placed for a large number of one-man cars, deliveries on which have started. So far it has received twelve new cars of this type, which have just been placed on the Chestnut Street line. Within a period of thirty days the company has lost a total of fifty-four cars, having lost thirty-five in the Fourth Avenue carhouse fire, seventeen in the fire on Feb. 16 and two demolished, one when struck by a freight engine at Fifteenth and Magnolia Streets on Jan. 19, and another on Feb. 12, when a heavy passenger train struck a car at Fourth and A Streets. These losses have been referred to previously in these columns.

Track and Roadway

South Covington & Cincinnati Street Railway, Cincinnati, Ohio, is in the market for 100 tons of groove and 100 tons of T-rails.

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind. will soon begin work on improving the south side right of way along Lincoln Way West in Mishawaka, Ind.

Los Angeles (Calif.) Railway will soon start work on the rebuilding of the Grand Avenue line from Pico to Jefferson with new ballast and ties.

Reconstruction jobs on Main and Hoover Streets have just been completed.

Seattle, Wash .- The City Council finance committee has recommended the sale of bonds to finance repaving and relaying of street car tracks on Jackson Street, between First and Third Avenues. Total cost, which the street car lines will absorb, is \$150,000. and City Engineer J. D. Blackwell has asked the Council's advice on how to obtain the money. All the remaining funds in the depreciation reserve fund, \$56,000, have been appropriated by the committee at the request of Superin-tendent of Municipal Railways D. W. Henderson for relaying the track on Westlake Avenue North, from Mercer to Fulton Streets, at a total cost of \$99.406

Power Houses, Shops and Buildings

Georgia Railway & Power Company. Atlanta, Ga., is now building its new Moreland Avenue substation, which is to be finished by September. The cost is estimated at \$150,000.

Charlottesville & Albemarle Railway, Charlottesville, Va., has installed and put in operation its new 1,500-kw. G. E. turbine. The company will now purchase and install one 750-hp. 225-lb. working pressure boiler with stoker.

Northern States Power Company, Fargo, N. D., as part of its \$80,000,000 ten-year hydro and steam power construction and development will start work on a new terminal substation in Minneapolis. The station will serve the downtown and northwestern sections of the city.

Boston (Mass.) Elevated Railway has awarded a contract to the National Engineering Corporation of Boston for the construction of a three-story, 41 x 140 ft. concrete storage addition on George Street, Somerville, Mass., for its own use. The structure will cost about \$80,000.

Trade Notes

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., recently received an order from Frank C. Roberts & Company, consulting engineers, for electrical apparatus for an iron and steel rolling mill in Spain.

Hall Brothers' Cedar Company, Coeur d'Alene, Idaho, has announced the removal of its general office from Jacksonville, Tex., to Coeur d'Alene, Idaho. The company will engage in the manufacture and wholesaling of western red cedar posts, poles and piling.

National Railway Appliance Company, New York, N. Y., announces its appointment as Eastern agent for the Lind aluminum field coils handled by the Economy Electric Devices Company, Chicago. All Inquiries may be directed to the company's office, Grand Central Terminal, 452 Lexington Avenue, New York.

W. W. Reddie has been appointed assistant to the manager of the industrial department of the Westinghouse Electric & Manufacturing Company, according to an announcement made by W. S. Rugg, general sales manager of the company. He will be in charge of the railroard shop, metal working, machinery manufacturers, and material handling machinery sections of the department. Mr. Reddie has long been active in promoting the use of new motor and control applications in railroad and metal working shops and in development of electric arc-welding equipment.

Conveyors Corporation of America. Chicago, Ill., has announced the acquisition from the Green Engineering Company, East Chicago, Ind., of all rights to the Green steam jet ash conveyor. The transaction, which became effective Feb. 1, 1923, gives to the Conveyors Corporation of America all the patterns. patents and manufacturing rights pertaining to the Green conveyors. All orders for replacement parts and extensions to the Green conveyor will be filled by the Conveyors Corporation of America. The acquisition of the Green conveyor does not in any way affect the personnel or policies of the Conveyors Corporation.

Professional Notes

McClellan & Junkersfeld, Inc., New York, N. Y., announce that Renshaw Borie is associated with them in their work of engineering, construction and management and is in charge of their Philadelphia office.

Cloyd M. Chapman has become affiliated with Dwight P. Robinson & Company, Inc., as consulting materials engineer. Mr. Chapman, who has been active in the work of the American Society of Testing Materials and the American Concrete Institute, will in the future represent Dwight P. Robinson & Company in the committee work of these societies.

Stevens & Wood, Inc., 120 Broadway, N. Y., announce that the engineering and construction business formerly conducted by Wood Hulse Yates Company, Inc., has been taken over and the personnel increased by the acquisition of associates of wide experience. The members of the firm are R. P. Stevens, president of the Republic Railway & Light Company, and B. F. Wood, former chief engineer of the United Gas & Electric Engineering Corporation and actively engaged in the engineering business in the company of B. F. Wood, Engineers, Inc. The new firm announces that it will give personal attention to all engineering and construction work, including investigations, reports, appraisals, designs, railroad electrification, terminal and shop facilities and port and harbor works and will supervise financing, operation and management of utility and industrial properties. The identification of Mr. Stevens with such engineering practices will in no way interfere with his connections with the Republic Railway & Light Company.

PEACOCK



Staffless Brakes

Have 5 Important Points of Superiority

1. Braking Power

At least three times as powerful as any ordinary type hand brake. The motorman's effort is most rapidly and effectively converted into braking power.

2. Chain-Winding Capacity

Ample space to wind up all the chain without jamming or binding. An excess of slack cannot put this brake out of comission.

3. Platform Space

Designed to occupy minimum platform space. It projects only six inches into the vestibule from the dash. This feature is especially valuable in view of the narrow entrance and exit facilities of the safety car.

4. Simplicity of Operation

Motormen like the Peacock Staffless—it is easy to understand, simple to operate and always dependable.

5. Lowest Maintenance Cost

Repair bills are practically nil. The Peacock Staffless Brake is so simple and so rugged that there is little or nothing needed to keep it in repair.

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Canadian Representative: Lyman Tube & Supply Co., Montreal, Can.

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GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

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Transmission Line and Special Crossing Structures, Catenary Bridges

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JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

PIQUA, OHIO

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Incorporated

Design and Construction of Electric Roilways, Shops, Power Stations

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Loe Angeles

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THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK

Street Railway Inspection
DETECTIVES

131 State St. **BOSTON**

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Braymer's

ARMATURE WINDING AND MOTOR REPAIR

15 pages 6 x 9, illustrated. \$3.00 n.t. post raid This book is a compilation of practica methods used by repairmen and armature winders. It gives in detail those methods which have been found by actual experience to represent best practice in a repair shop of average size.

McGraw-Hill Book Co., Inc., 379 Seventh Ave., New York, N. Y You may send me on 10 days' approva Braymer's Armature Winding and Motor Repair, \$3.00 net, postpaid, I agree to pay for the book or return it postpaid within 10 days of receipt. Regular subscriber to the Electric Rall-

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THERMIT INSERT RAIL WELDS

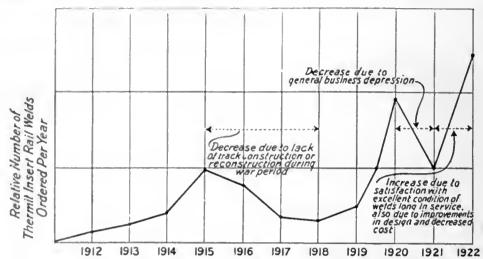


Chart showing the remarkable growth in popularity of the Thermit Insert Rail Weld

The Best Year of the Best Rail Weld

The above chart shows eloquently the remarkable growth in popularity of the Thermit Insert Rail Weld. Note that ever since the earliest Thermit Insert Welds were installed by this method in 1912, the trend has forged steadily upward year by year (excepting during the War years when there was little track construction and during the business depression over 1921) until 1922, when the number of Thermit Welds installed exceeded the number put in the track during 1920, the next best year, by over 25%. 1922 stands also as a peak in regard to the number of different properties during the year which installed Thermit Insert Welds, also as regards the number of new users.

Jodging by the unusually large number of Thermit rail welding inquiries and orders already booked for the coming year, the 1923 point on the chart line promises to scale much greater heights with many higher spurs to reach in future years. The underlying cause for this steady increasing popularity of the Thermit Insert Weld rests in the permanent and continuous nature of the joint obtained hereby, thus adding a much longer lease of life to the rail itself. The oldest welds, installed over 10 years ago in places such as Pittsburgh and elsewhere, are still in such excellent condition that these properties have adopted Thermit as standard and are yearly Thermit-welding thousands of additional joints. Many other properties have taken up the Thermit Insert Weld convinced beyond the shadow of a doubt by personal inspection of these welds in service that they require absolutely no maintenance and encouraged by the important improvements in methods of welding and decreased cost effected during the past year.

The greater the number of joints welded, the lower the cost per joint and the greater the output per welding gang.

Tell us the approximate number of joints to be welded and rail section number. We will then send you a prompt quotation.

Metal & Thermit Corporation

120 Broadway, New York

PITTSBURGH

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TRVINGTON seamless bias tape varnished cambric is made in widths of ½ in. and wider. Length 36 and 72 yd. rolls. Thickness .005 to .015 in. The advantages of a SEAMLESS over a sewed bias tape are: It can be continuously wound without the necessity of stopping to cut out a seam. Absence of seam avoids air pockets and the consequent lowering of dielectric at that spot. Can be wound with a taping machine. Will successfully supplant method of insulating with linen tape and the subsequent impregnation with insulating varnish. Seamless bias can be wound with lap instead of butt joint.

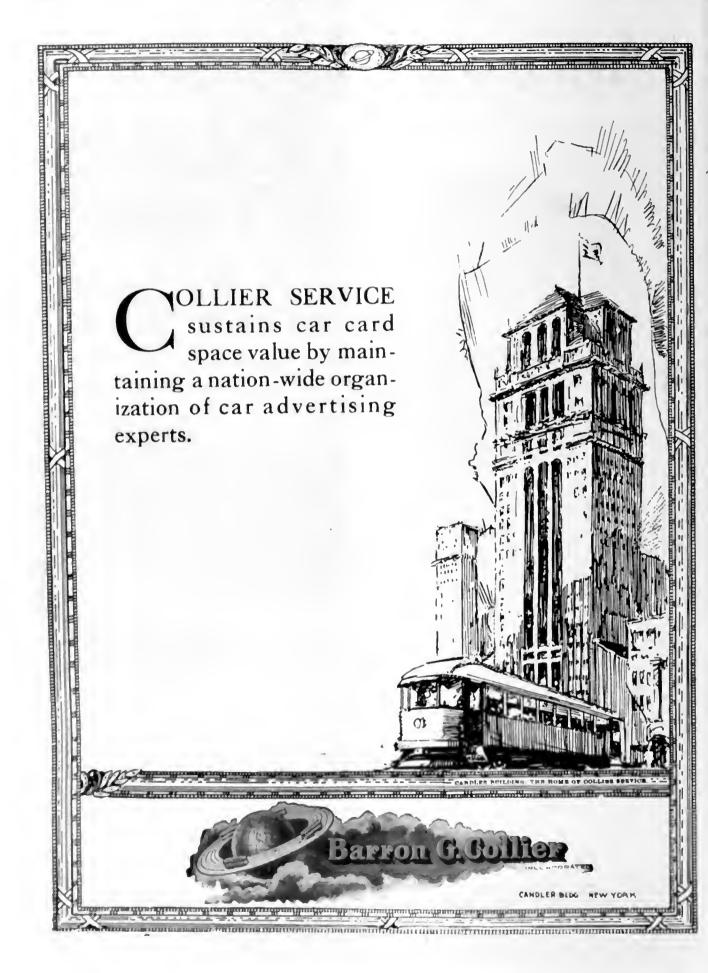
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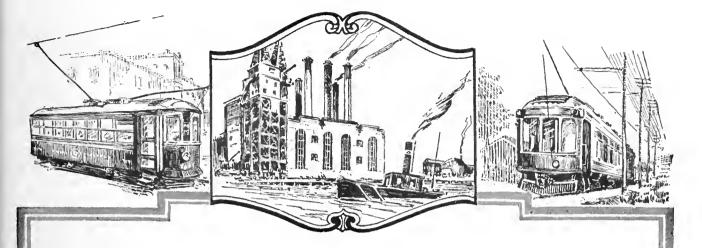
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When you're up against it for oil

Of course, roads don't wait until their oil is all or nearly gone before they order more.

But once in a while you do get up against it where you MUST have prompt delivery.

In such instances you can rely on The Texas Company. The Texas Company has adequate facilities for speedy delivery in any quantity to any purchaser, any time, anywhere.

We maintain District Offices at most prominent industrial and rail centers. Over 700 of the Company's stations for delivery of Texaco Lubricants and Texaco Burning Oils are scattered throughout the country.

In addition to this, we maintain over 600 warehouses, hundreds of storage tanks, huge fleets of auto trucks, and over 5,000 tank cars.

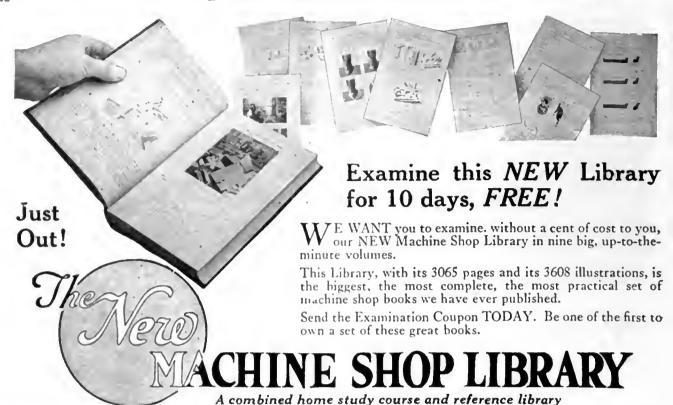
Texaco Service means the right oil for the right place at the time you need it.

Within our delivery radius from all of these stations, we can assure our customers against vexatious freight delays.

Whether you mail, wire or 'phone your orders, we execute them with a "zip."

There is a Texaco Lubricant for Every Purpose





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When the Rail Gets This Way-

RECIPROCATING GRINDERS will restore the original rail-head



But better yet—

don't ever let the rail become so badly corrugated!

How does the rail get that way? Simply by neglect, which only hastens the day when complete renewal must be made.

Many roads now effectively prevent such conditions by constant use of Reciprocating Grinders. At the first sign of corrugation, a small amount of work, quickly done, removes all trace and leaves the rail-head with a smooth tractive surface.

Equip with Reciprocating Grinders Now

RAILWAY TRACK-WORK CO., 3132-38 E. Thompson St., PHILADELPHIA, PA.

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Chas. N. Wood Co., Boston.

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Why One Advertising Appropriation Was Increased

TWO partners were debating their advertising policy planning the campaign for the next six months.

Theirs is a retail store which spent in one year \$12,000 on its advertising which was 5% of their yearly volume, a fair expenditure in their line of business.

In growth of sales they could easily point out the home-coming of the \$12,000 with a fair and reasonable profit in its train. For these two partners that expenditure was a profitable short-term investment.

One of the partners spoke up:

"John," he said, "we have a cash profit in the bank from that \$12,000, but we have a greater intangible profit by far—it is piled up for us in the minds of every man and woman in the city.

"It is reflected in the attitude of our bankers.

"It is present in the minds of the manufacturers who sell us.

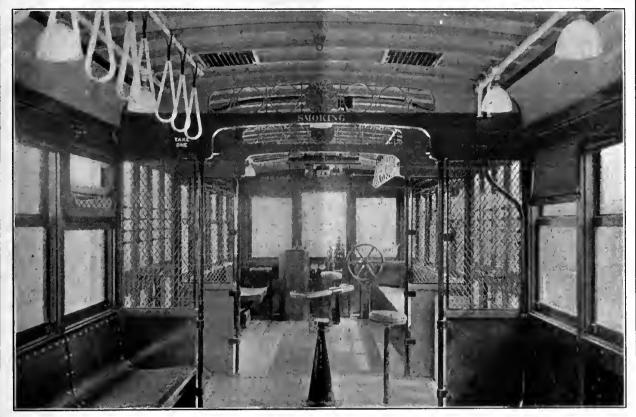
"It is working on the minds and purses of every one of our customers."

"Why," he continued, "this business, because of the advertising we have done, is worth \$12,000 more than it was before we began."

The two partners increased their appropriation, modestly, it is true. That was five years ago. Today, for it is in a large city, their appropriation is eight times their original amount. Their standing, with bankers, manufacturers and customers is A-1. Their business has grown and grown in a healthy way. And still as one of them put it—

"In the last five years advertising has made money for us. Every cent we've spent has come back to us, and brought another with it. But, our real profit—our big profit from that advertising is banked in the minds of the people. Ours is the best known business of its kind in town. And that is worth a lot of money to us."

Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies



Interior view of HASKELITE roof—no headlining Forty (40) similar cars built for Municipal Railways of San Francisco

Attractive Ceilings Without Headlining

HASKELITE Advantages

- 1. Lightness in weight.
- 2. Superiority in strength.
- 3. More simple in construction.
- 4. More permanent in service.
- 5. More attractive, both inside and outside
- 6. HASKELITE roofs are leak proof.
- 7. HASKELITE panels alone pass the Navy Grade "A" test.

HASKELITE roofs have many advantages: First, they are easier and cheaper to apply. The panels are furnished moulded. No special knack is required. The panels are simply laid on and fastened in place, four or five sections to each car. Second, HASKELITE roofs practically eliminate repair troubles. They will not rust as steel. Nails do not work up, resulting in leaks. There are no slats to work loose.

Third, they are unusually attractive both inside and outside. Particularly from the inside, the appearance is unequalled. There are no grooves. HASKELITE takes an excellent finish and is exceptionally easy to clean.

Fourth, headlining is unnecessary and frequently is not used. This saves material and labor in applying the roof.

Write for our blue print booklet descriptive of the HASKELITE roof and for samples of the 3/16 in. HASKELITE lining—the lightest weight head lining made today.



HASKELITE MFG. CORPORATION

133 W. Washington St., Chicago, Illinois



"Sorry to have

The orders are coming out now for electric railway equipment, materials and supplies.



kept you waiting"

The Annual Maintenance Number of the Electric Railway Journal will appear March 17. Get your copy in. Forms close next week.

HERE IT IS!



THE PARAGON The New Continuous Roller Side Bearing

Designed

To Meet Every Requirement for Which a Side Bearing is Intended.

The Only Wearing Part (the Bearing Bushing) is Interchangeabe and Easily Renewed

A Folder Illustrating and Describing This New Bearing Has Been Prepared and Will Be Mailed to You

The Burry Railway Supply Co.

1316 Peoples Gas Building, Chicago, Ill.

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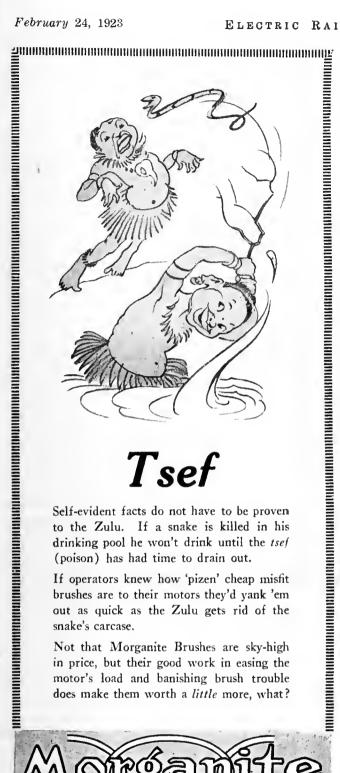
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Ebony Asbestos Wood

For mounting electrical "brains"

ONTROL and regulating apparatus has been aptly termed the "brains" of an electrical installation.

Here, Ebony Asbestos Wood is chosen as a mounting-not so much on account of its superior strength, workability and appearance on less important work-but because of its absolute reliability. By protecting the control apparatus, this reliability safeguards the entire system which this apparatus serves.

> JOHNS-MANVILLE, Inc. Madison Ave., at 41st St., New York City Bronches in 56 Large Cities

For Canada: Canadian Johns-Manville Co., Ltd., Toronto





Use Bates Steel Poles

with other first-class equipment and the whole installation will be permanent and an inducement for your security buyers.

> Have you your Bates Treatise on Steel Poles?

ates Expanded teal russ &.

208 South LaSalle Street, Chicago, U. S. A.

RATEXPANDED FC

Women know what they want — and get it

A woman buys many different food products, dozens of fabries and articles of apparel, shoes, things for the home, toilet preparations—quite probably in a year she makes a thousand purchases. Personally to judge the quality of each, she would need to be a chemist, an engineer, a metallurgist and a good many other things.

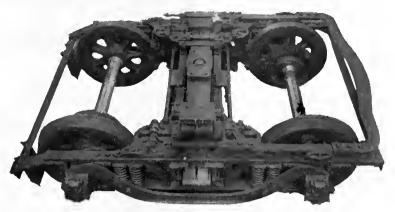
So, given the choice, of course she buys the goods she knows in preference to those she does not know. And she is going to have that choice for a good many years. She is boss.

Manufacturers who want to work for her must realize this:—They must put in their application at once; convince her of their intention and ability to give her merchandise of known value; and then live up to the standard.

For she is a just but ruthless boss. She neither forgets nor forgives. She rewards loyal service with loyalty, but her condemnation of broken faith is final.

Her favor is the sunlight of success; her indifference, the outer darkness.

Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies



Baldwin Type "A" Motor Truck Built for Kobe Himeji Electric Railway, Japan. Gauge, 4ft. 8½ in. Wheel base, 78 in. Center Pin load maximum, 25,000 lb. Service, passenger

Perfect Riding Qualities Characterize Baldwin Electric Motor Trucks

THE Bladwin Type "A" Truck illustrated meets the most severe conditions of high speed electric interurban and street railway service. It is built for inside hung motors and may be designed for any track gauge and wheel base to suit the motors, and for a center pin load of 20,000 to 30,000 pounds.

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Sofety cars are little things.
But they last for years:
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Made in the widest variety of styles and finish. There is a suitable type of Hale & Kilburn Seat for every kind of car and every kind of service.

And with the right Hale & Kilburn Seat for your special requirements, you will have a seat of superior attractiveness, maximum comfort, and real economy.

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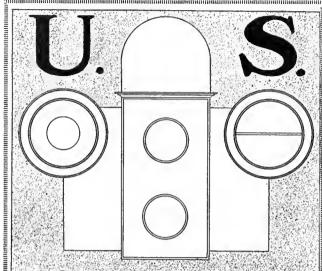
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AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adama; Cincinnati, Traction Bldg.; New York, 223 B'way

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Rome Merit Wins Customers Rome Service Holds Them

ROME WIRE COMPANY

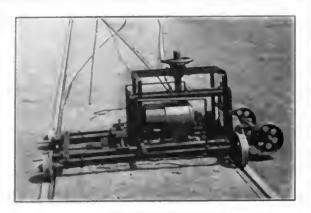
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You can do any kind of track grinding with a

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One reason why so many track men are enthusiastic about the Seymour "MIDGET" is because this one machine is so adaptable and adequate for any job they have. It grinds on the surface, or side of the rail, in grooves and points of special work, and also removes corrugations. And it is a one-man machine which simplifies and economizes on track grinding.

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Of the well-known WHARTON Superior Designs and Constructions

Steel Castinge Converter and Blectrie

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Gas Cylinders Seemless Steel

Wm. Wharton Jr. & Co. Inc., Easton, Pa. (Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.)

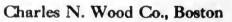
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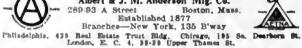


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Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronse and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches



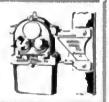
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Your best insurance against insulator breakage

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Builders since 1868 of Water Tube Boilers of continuing reliability

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Frogs. Crossings. Mates and Tongue-switches. Super-quality materials. Par-excellent designs. Gives many lives to one, of ordinary construction and when worn down. CAN BE RESTORED by INDIANAPOLIS WELDING.

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Efficient, Rapid, ECONOMICAL, Durable, Price, \$2.00 (per day for three hundred daya) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

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Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untrea

Indianapolis Welding Plates:

Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rali. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and CUONTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

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Manufacturers of

Special Work for Street Railways

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White Oak, Chestnut, and Treated Ties. Oak Switch Ties. Cross Ties:

Prompt shipment from our own stocks.

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Standard in the Electric Industries for 35 years

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COMPACT EMERGENCY DRESSINGS

Mark a new Era in First-Aid equipment for Electric Railways.

Each little packer contains a complete Surgical Dressing, sterilized, sealed, ready for instant use. Compact Emergency Dressings are modern, efficient, economical.

> Booklet J2 tells the story Send for it today

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Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.

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We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment.

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A Chain Hoist that excels in every feature. It has Planetary Genrs, Steel Parts, 3½ to 1 factor of Sufety. It's the only block that carries a five-year gusrantee.

FORD CHAIN BLOCK CO. Second and Diamond Sta., Philadelphia

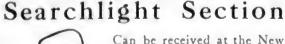
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high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

Alliance, Ohio

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For issue out Saturday

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Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

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Automatic Return Switch Stands for Passing Sidings
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More than seven thousand N-L Ventilators sold during 1922.

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Constant replacements cost Time, Trouble and Money. Correct Brushes correctly applied will eliminate these expense factors to a great extent.

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and be assured of the BEST Brushes that Men, Money and Materials can produce.

You will get

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Every brush futly guaranteed. You are the judge Write today for Catalog B-3

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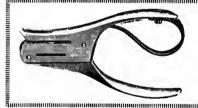
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Universal Safety Tread Company

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Offices in all Principal Cities Send for Catalogue RR

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A Style for Every Service

Send for Catole

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Good jobs appear under this heading in the

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EMPLOYERS! Use these columns for good men.

MEN! Consult these columns for good jobs.

8 cents a word.

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0130



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USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH COST LESS PER CAR MILE

W. J. Jeandron 345 Madison Avenue, New York Pittsburgh Office: 634 Wabash Bldg.

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The Differential Car An automatic dump car, an electric locomotive, a snow plow, and a freight car-all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation. The Differential Steel Car Co. Findlay, Ohio



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The trolley wheel with the high mileage side bearing

Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. Investigate them.

Send for descriptive circular

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Waterproofed Trolley Cord



ls the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY

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SILVER LAKE COMPANY

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AMERICAN RATTAN & REED MFG. CO. Brooklyn, N. Y.

AMERICAN means QUALITY RATTAN SUPPLIES OF EVERY DESCRIPTION

Rolled and Forged GEAR BLANKS

Midvale Steel and Ordnance Company Cambria Steel Company

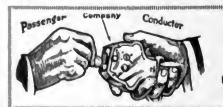
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"Paint Sells Transportation"

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BECKWITH-CHANDLER COMPANY NEWARK, N. J. 203 EMMETT ST



Direct Automatic Registration By the Passengers Rooke Automatic Register Co. Providence, R. I

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

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DRAFTSMAN wanted by a manufacturer of apecial track work in the East. Must be thoroughly familiar with designing and detailing both steam and street constructions. P-50I, Electric Railway Journal, Real Estate Trust Bidg., Phila., Pa.

DRAFTSMEN calculators wanted on special track work. With or without experience but must have thorough working knowledge of mathematics. P-518, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

FIRST class armature winder, one familiar with atreet railway motors. Address Master Mechanic, P. O. Box 407, Rens-aelaer, N. Y.

TRACK foreman for a street railway in Southern New Englannd. Should be experienced in handling large force of men on construction and maintenance work including installation of special work. State age, experience and salary expected. P-522, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

POSITIONS WANTED

MASTER mechanic desires position on small city or interurban property. I am at present employed and can give good references. PW-506, Elec. Ry, Journal, Old Colony Bidg., Chicago, Ili.

MASTER mechanic desires position.
Twenty years' experience on city and interurban properties in shop work and maintenance of way. Good references, Central West or Western States preferred. PW-515, Electric Ry. Journal, Old Colony Bldg., Chicago, Ill.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all detalla and handle same in a manner that would be a credit to your property? Successful in public relations, safety campaigns and capable of getting resulta from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-520, Elec. Railway Journal, Leader-News Bidg., Cleveland, Ohio.

SUPERINTENDENT of transportation or apperintendent accret service. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant—personal reasons for dealring a change. PW-517. Electric Railway Journal, Old Colony Bidg., Chicago, Ill.

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Ohio Representation
Established manufacturers agent covering
Ohio desires account with manufacturer
of electric railway equipment. RA-523,
Electric Railway Journal, Leader-News
Bidg., Cleveland Ohio.

SALESMAN AVAILABLE

SALESMAN, paints, oils, railway special-ties. Acquainted among steam and troi-ley roads. Will travel. SA-521, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

New 3/0 3-Phase LEAD COVERED COPPER CABLE

15,600 ft. on Reels 150 ft. to 450 ft. Price per foot 80 cents.

F.O.B. Buffalo, N. Y.

BUFFALO HOUSEWRECKING & SALVAGE CO. Buffalo, N. Y.

FOR SALE—A BARGAIN

4—Passenger Motor Cars—4

Weight 47,000 lbs. Geared 64-20 Single end cars-Leather upholstered seats Seats 44—Passenger Compartment 32 and Smoker 12

4 G.E. 203-L Motors-K-35-G Control St. Louis No. 47-B Trucks-Steel Body Have been run only 357,000 miles per car at low speed and have always been properly maintsined.

Are in excellent condition in every way!

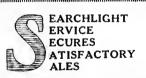
El Paso Electric Railway Co. P. O. Box 431, El Paso, Texas

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100 New

Peacock Hand Brakes

TRANSIT EQUIPMENT CO. 501 Fifth Avenue, New York.



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> NEW and RELAYING

of all Sections

HYMAN-MICHAELS CO.

Peoples Gas Building, Chicago, Ill.

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Write or wire when in the market to BUY or SELL

Please Mention this Publication

FOR SALE

On Account of Changing Frequency

2-1500 kw., 25 cy. Turbo Generator Sets, with surface condenser.

2-1000 kw. Motor Generator Sets.

-200 kw., 4-300 kw. and 3-500 kw., 25 cy. Rotary Converters.

Indiana Service Corporation 122 E. Wayne St., Ft. Wayne, Indiana

FOR SALE

20-Peter Witt Cars

Weight Complete, 33,000 lbs. Seat 53, 4—G. E. No. 258-C Motors, K-12-H Control, West. Air Taylor Trucks, R.H. Type. Complete,

ELECTRIC EQUIPMENT OO,
Commonwealth Bidg., Philadelphis, Pa.

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION IS HELPING OTHERS LET IT HELP YOU ALSO

0079

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car Collier, Luc., Barron G. Air Receivers, Aftercoolers Ingersoil-Rand Co Ingersoil-Rand Co
Anchors, Guy
Electric Service Bup. Co.
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Standard Steel Works Co.
Westinghouse E. & M. Co.
Armaiure Shop Teels
Esec. Service Buppiles Co.
Natematic Return Switch
Stands
Ranapo Ajax Corp.
automatic Bafety Switch
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Kamapo Ajax Corp.
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Ramapo Ajax Corp.
Asies
Bemis Car Truck Co.
Lambria Steel & Ord. Co.
Midvale Steel & Ord. Co.
Millo. The J. G.
Carnegte Steel Co.
Westinghouse E. & M. Co.
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Habbit Metal
More-Jones Br. & Metal Co.
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Electric Service Sup. Co.
Internat'l Register Co. The
Hearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gibert & Sons, B. F. A.
Le Grand, Iso., Bis.
More-Jones Br. & Metal Co.
Westinghouse E. & M. Co.
Hearings, Center and Reliev
Side
Baldwin Locomotive Works
Hurry Railway Supply Co.
Stuckit Co. A.
Hearings, Roller
Stafford Roller Bearing Car
Truck Corp'o
Bells and Gengs
Brill Co., The J. G.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Boliers
Babeock & Wilcon Ch. Electric Service Sup. Co.
Rolices
Babcock & Wilcon Co.
Roller Tubes (Charcoul Iron
and Steel)
Cambria Steel Co.
Midvale Steel & Ord. Co.
Ronding Apparatus
American Steel & Wire Co.
Electric Service Sup. Co.
Indianapolla Switch & Free
Co. One Brass Co.

Bail Weiding & Bonding On Railway Trackwork Co.

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Ohio Brass Co. Co.
Ohio Brass Co.
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Railwar Track Work Co.
Rail Welding & Bonding Co.
Westinghouse E & M. Co. ok Publishers fedenw Hill Book Co. McGraw Hill Honk Co Brackets and Cross Arma (flow size Poles, Ties, Posts, etc.) Rates Exp. Steel & Tr. Co Electric Revice Sup. Co. Electric Service Sup. Co. Hinbard & Co. Ohlo Bress Co Brake Adjusters Nutional Ry. Appliance Co Westinghouse Tr. Br. Co Brake Roses Westinghome Tr Br Co

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Raghrage Stockwell Co

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Belli Co. The J G

Columbia M W & M I Co

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Breake Faris

Ackley Brake & Sopply

Corp.

1011 Chalmers Mfg Co.

Remis Car Truck Co.

Belli Co. The J G

Columbia M W & M I Co.

Conversi Electric Co.

Johns Manville Inc.

Westinghome Tr Br Co.

Remons, Track, Steel E Este ton Amer Ratten & Reed Mfg Co Iraches, Curbon General Mortele Co Franction, W J Le Carbone Co

Morganite Brush Co, westinghouse K. & M. Co. Brushes, teraphite Morsenite Brush Co. U. S. Graphite Co. Brushes, wire Pheumate ingersoil-Rand Co. Brush Holders Anderson Mig Co., A & J. M. Columbia M. W. & M. L. Co. J. M Columbia M. W. & M 1 Co Columbia M. W. & M 1 Co Buaca, Motor Brill Co., Tho J. G. Bushings, Case Hardened and Manganese Bemis Car Truck Co Brill Co., Tho J. G. Bus Seata Hale & Kilburn Corp. Cables (See vires and Cambric, Tapes, Vellow A. ('ables)
('ambre, Tapes, Yellow & Black Varnished Irvington Varnish & Ins. Co. Carbon Brushes (See Brushes Carbon)
(ar Lighting Flutures Elec. Service Supplies (ar Fanel Safety Switches Consolidated Car-Heating Co. Westinghouse E. & M. Co. Cars, Dump Westinghouse E. & M. Co. Care, Hump
Differential Steel Car Co. Care, Fassenger, Freight
Express, Etc.
Amer. Car Co.
Hrill Co., The J. G.
Cambria Steel Co., G. C.
Midwale Steel & Ord. Co.
National Ry. Appliance Co.
Wasson Mig. Co. Wason Mfg. Co.

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Electric Equipment Co
Cacs, Self-Propelled
General Electric Co.
Cathings, Brass, Composition
of Copper
Anderson Mfg. Co., A. &
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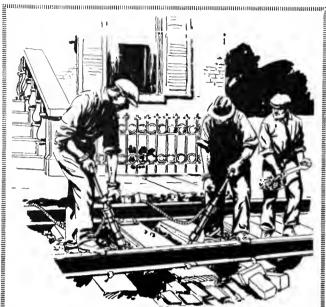
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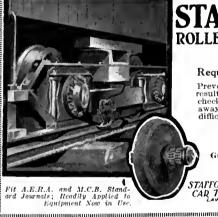
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ALPHABETICAL INDEX TO ADVERTISEMENTS

10	net l	Page !	Page	Page
A Askley Brake & Supply Corp Allia Chaimera Mfg. Co Allison & Co. J. E	39 31 10 39	Earli, Chas. I. 41 Economy Electric Devices Co. 42 Ecertric Equipment Co. 37 Electric Rallway Equipment Co. 31	Kelly, Cooke & Co	Richey, Albert S
American Uar Co. American Escitical Works. American Estata & Reed Mfg. Co. American Steel & Wire Co., American Steel & Wire Co., Anderson Mfg. Co., A & J. M., Endrew Sangeter & Co., Archbold Brady Co., Arnold Co., The.	17	Electric Service Supplies Co. 9	Lapp. Inc., Co., Inc	Samson Cordage Works 42
Balwock & Wilcox Co	29	General Electric Co	More Jones Brass & Metal Co. 36 Morganite Brush Co. 27 Morton Mig. Co. 42	Truck Corp'n
Beckwith-Chandler Co Beeler, John A Bemis Car Truck Co Bonney-Vehslage Tool Co Brill Co, J. G Buckeye Jack Mfg Co Burry Railway Supply Co Byllesby & Co. H M	36 16 42 35 43 31 26	Halo & Kilburn Corp. 30 Hackelite Mfg. Co. 25 'Help Wanted' Ads. 37 Hemphili & Wells. 16 Heywood Wakefield Co. 41 Holst Englehardt, W. 16 Hubbard & Co. 32	Nachod Signal Co., Inc. 32 Nashville Tie Co. 33 National Brake Co. 15 National Poeumutic Co., Inc. 11 National Railway Appliance Co. 34 New York Switch & Crossing Co. 32 Nichols-Lintern Co. 35	Texas Co
Cambria Steel Co	36	Indianapolis Switch & Frog Co. 33 Ingersoll-Rand Co	Otto Brass Co	U. S. Electric Signal Co
Carnegae Steel Co	33 20 30 42 42 41	struction Co	Page, Steel & Wire Co	Want" Ads
Day & Zimmerman Co. Inc. Differential Sizel Car Co	16 36	Jackson, Walter 18 Jeandron, W. J. 36 Johns-Manville Inc. 27 Johnson Fare Bux Co. 12	Rail Joint Co. 33 Railway Track-work Co. 23 Railway Utility Co. 41 Ramapo Alax Corp. 34	White Engineering Corp., The J. G



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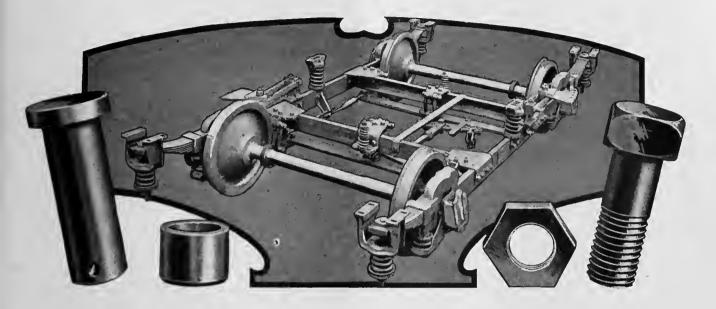
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